This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

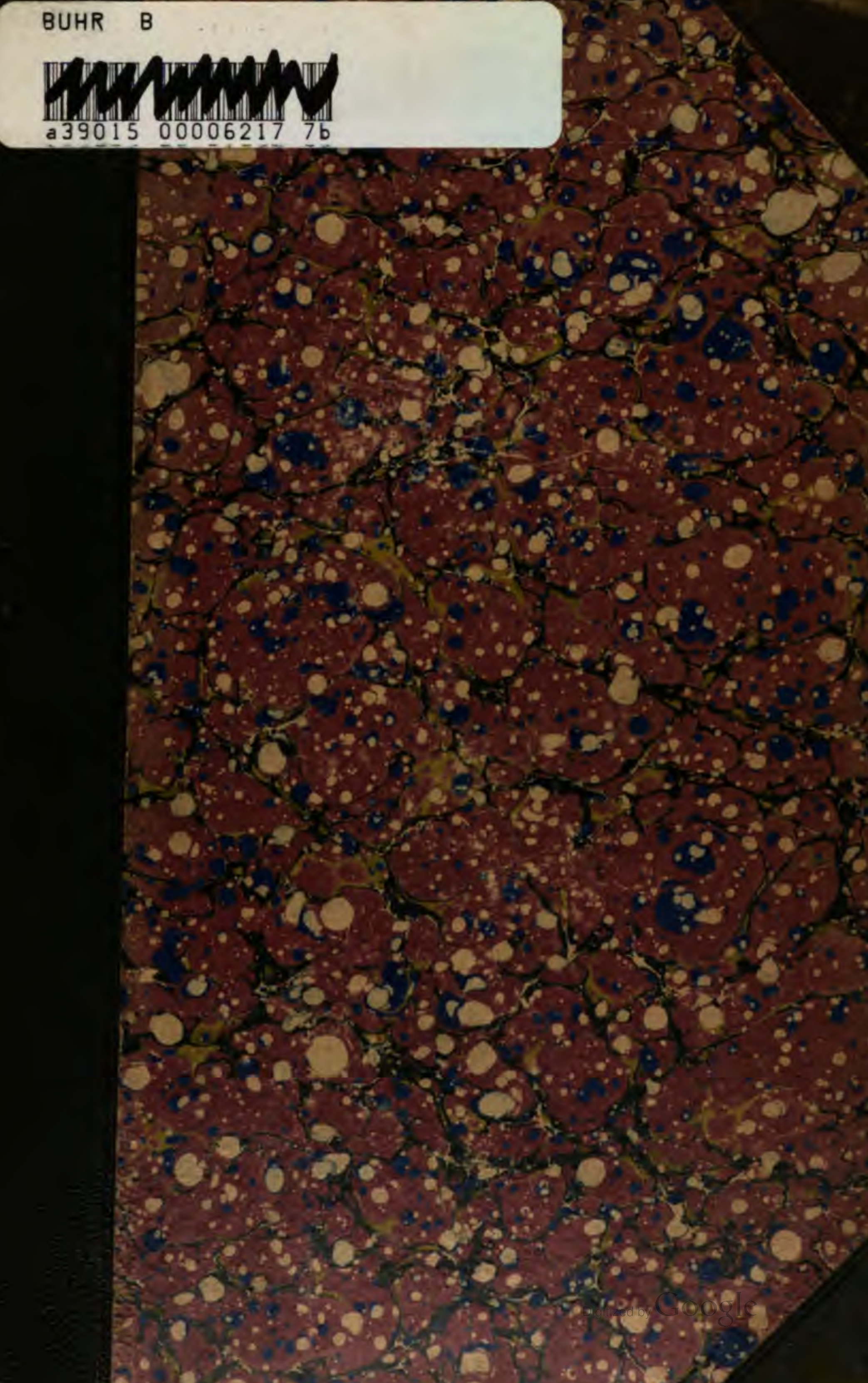
We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

BUHR B
a39015 00006217 7b



13 2

1837
ARTES VERITAS SCIENTIA
LIBRARY OF THE
UNIVERSITY OF MICHIGAN
TUEBOR
SI QUAERIS PENINSULAM AMOENAM
CIRCUMSPICE

THE GIFT OF
G. E. Stechert & Co.

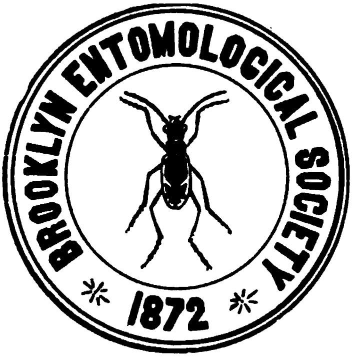
SCIENCE LI
QL
46
.B

BULLETIN

—OF THE—

Brooklyn Entomological

SOCIETY.



VOLUME VII.

BROOKLYN, E. D.

MAY 1884. —— APRIL 1885.

BULLETIN

—OF THE—

Brooklyn Entomological Society.

VOL. VII. BROOKLYN, MAY, 1884. No. 1.

To our Friends and Subscribers, Greeting.

We present you herewith number one of the seventh volume of our Bulletin. In vol. VI we tried the experiment of enlarging our paper, and presenting a somewhat greater variety of matter. The promises made in the Introductory we think were kept, so far as space allowed us to keep them. The support accorded to us was not all we had hoped for, but was still sufficient to encourage us to preserve. We shall make the numbers of the present volume of the same size as those of the last—12 pages. We shall, as in that volume, present Synopses of both Coleoptera and Lepidoptera; some descriptions of new species; life histories; descriptions of larva; papers of general interest; and a series of introductory articles on Coleoptera and Lepidoptera: designed, in the case of Coleoptera as an introduction and aid to the use of the "Classification"; and in the case of Lepidoptera, to explain to beginners and students generally the characters of the families and genera, and how to place, at least approximately, any lepidopterous insect that may be found. These papers will be illustrated. In number 2 or 3 we will begin a monograph of the American *Catocala*, to be illustrated by a plate giving structural peculiarities.

We earnestly ask that our friends do aid us; first, by sending in items of interest, and occasional articles; second, by recommending our paper to their entomological friends; third, by sending in their subscriptions at as early a date as possible.

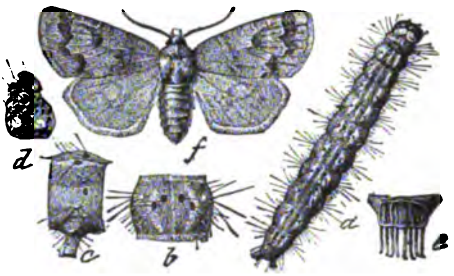
Money orders should be made payable to the society, and they, as well as all communications should be addressed to JOHN B. SMITH, Editor, 290 Third Ave., Brooklyn, N. Y.

THE PUBLICATION COMMITTEE.

Acronycta betulae, N. Sp.

By Prof. C. V. Riley.

An interesting and easily recognized species of the genus Acronycta has, to some extent, been distributed by me under the above MS. name and I would herewith characterize it:



Acronycta betulae: **a larva, dorsal view; f imago—nat. size: b a middle segment of larva, dorsal view; c do. side view: d portion of larval skin showing spinose covering; e cremater of pupa with spines, dorsal view.**

Acronycta betulae, N. Sp. Average expanse 37 mm. General color clay-yellow or pale buff with silver-gray hues. Maculation subobsolete, except the t.p. line. Form of body and wings most nearly approaching *tritona,* i. e. primaries short, broad and with apex rectangular. None of the ordinary longitudinal marks at base or between veins 1 and 2 or 6 and 7: the ordinary maculation much as in *innotata* but in faint fuliginous and sienna; orbicular usually quite obsolete; where indicated it is by relief basally of the t.a. paler line and posteriorly by the paler space between it and the reniform which is more plainly indicated, especially on the basal side, by a sienna border. T.p. line as in *Grotfii,* the inner angle between veins 6 and 7 more pronounced but without the tooth of *tritona,* the outer angle on vein 1 more pronounced and acute; well relieved basally by silver-gray and posteriorly by a sienna-brown line and coincident subterminal shade. Posterior border usually shows a distinct pale line, the fringes being either of the general hue or darker with paler interruptions on the veins. Secondaries well rounded, clay-yellow with very faint discal and transverse, fuliginous shade. Head and thorax concolorous with primaries except a slender brown streak on outside border of tegulæ. Under surface uniformly pale clay-yellow with discal and transverse shade on secondaries intensified, and similar shades on primaries, the transverse line strongly elbowed: borders of wings, especially of secondaries, may also be dotted with brown though usually concolorous: antennæ beneath, front tarsi and a patch on outside of palpi dark brown.

♂ usually more strongly marked than ♀. Claspers of ♂ consisting of a long curved hook with a broad excavate main shank and an inferior broad tooth or projection having parallel sides.

Described from 9 ♂s 4 ♀s reared from larvæ feeding on *Betula nigra.*

Larva. Average length when full grown 38 mm. Color greenish-gray before last molt with a whitish medio-dorsal, and an undulating sulphur-yellow subdorsal line, more or less distinct. After last molt vinous-brown without the dorsal lines. Sparsely covered (head and legs included) with short white or gray hairs arising from pale papillæ and thickest at sides and subventrally, so as to give a somewhat gastropachiform aspect. The general surface of the body which appears smooth to the naked eye is thickly and evenly beset with minute black points. Ordinary piliferous spots papillose and pale except on dorsum where they are black with pale papillæ, usually 3 papillæ to each spot, except on thoracic joints where there are more. Head rather small, the tops of lobes reddish-brown the face pale yellowish with distinct black mottlings on the cheeks and bordering the red top. Stigmata with black annulus.

Pupa. Highly polished. Abdominal joints above sparsely and shallowly punctate. Cremaster consisting of a small series of converging ridges dorsally, and ending in some six or more short, almost straight spines in a horizontal row.

A strongly marked species. In some of the paler specimens there is a suggestion of olivaceous; while the darker specimens have more uniformly gray primaries with the strongly relieved t.a. pale line, and brown reniform and subterminal space as the most prominent features.

The larva while young is found on the leaves and corresponds therto in general color. After the last molt it rests stretched on the thickest branches of the tree and is fond of hiding in dark recesses. For pupation it forms a slight cocoon either among leaves or in old wood on the ground, or on the trunk of the tree. There are two annual generations at Washington, the first larvæ occuring in July and the second brood in October: while the first moths from hibernated pupæ appear in April and the second brood in August.

The species, both in the characters of its larva and of the ♂ genitalia, shows affinities with that group of the genus which includes *morula*, *occidentalis*, *furcifera*, *hasta*, *lobeliæ* and *radcliffii*; while the genitalia, alone considered, would separate it from *innotata* with which, especially the form *Græfii*, it otherwise shows the closest relationship. My studies of the genitalia of the genus have, however, so far led to no definite conclusions as to their real value in classification.

New Species of Noctuidae.

By John B. Smith.

The following descriptions are published in advance from the manuscript of an exhaustive monograph of the *Noctuidæ* in preparation by myself and Prof. C. V. Riley. To save trouble in changing the name, should the species be described by some other author before the monograph is published.

Demas flavicornis, n. sp. Of a pale ash-gray color, sprinkled with black. Head paler, antennæ yellow. Primaries with base somewhat whitish on costal half; t.a. line very faintly indicated, and apparently oblique. Median space darker, relieved only by the pale punctiform orbicular. Beyond this dark median space, the wing is uniformly gray, crossed by a slightly darker s.t. shade, outwardly determinate and somewhat dentate. Secondaries and abdomen uniformly mouse-gray. Beneath, whitish gray; primaries rather darker through centre.

Expands 1.36 inch. 34 mm. *Hab.* New Jersey.

This is the first species of this genus hitherto discovered in our fauna. *Demas* is characterized by naked eyes; soft membraneous tongue; unarmed legs; and by having the accessory cell of primaries on a stalk beyond the discal cell.

The type of the present species is in Mr. Graef's collection.

Bomolocha umbralis, n. sp. Color even, dull, smoky brown, primaries flecked with scattered violet scales, most numerous just beyond the t.p. line and at the apex. T.a. line scarcely discernible, broad, diffuse, hardly darker than ground color, thrice scolloped in its course. T.p. line distinct, dark, outwardly shaded by a narrow white line, and a few violet scales. S.t. line very faintly traceable as a zig-zag pale line. A row of terminal black dots. Stigmata obsolete; the small punctiform orbicular only visible. Secondaries evenly colored, immaculate. Beneath immaculate, somewhat paler ground color above.

Expands 1.12 inch. 29 mm. *Hab.* Florida.

This species is very distinct from all others heretofore described, in maculation and wing form; to a certain extent connecting *Bomolocha* with *Hypena*. The primaries while normally wide, have the apices acute, and slightly produced, while the secondaries are proportionately larger than in the other species of the genus. It is perhaps nearest to the *ketulus* variety of *deceptalis*, but differs from it and indeed all others, in the *outwardly* oblique curve of the t.p. line.

One ♀ specimen furnished the type.

Hypena decorata, n. sp. Primaries of a yellowish-brown ground color, with transverse lines and subapical shade darker, more blackish; a paler whitish shade beyond the t.p. line, and above the subapical darker shade. Along the costa, there is a series of narrow black lines which are traceable entirely across the wing, though, except in the white shade, they are nowhere as distinct as on the costa. T.a. line pale, shaded with dark brown, with a distinct acute outward angulation on the median vein. In the median space the cell is darker and there is a distinct black dash connecting the stigmata, which are represented, the orbicular by a round tuft, and the reniform by a narrow line, of raised scales. Another distinct tuft of raised scales in the submedian space near the t.p. line. The t.p. line is blackish; straight from costa to the submedian space, where it forms one broad, scarcely acute tooth. Beyond, the white shades off into the ground color to outer margin, interrupted by the punctiform s.t. line and the subapical black shade. Secondaries uniformly smoky. Beneath, smoky. Primaries with the discal dot, a transverse line and terminal shade, darker, and two small costal dots near apex bluish white. Secondaries with a discal darker transverse line.

Expands 1.25—1.35 inches, 33—to 36 mm. *Hab.* Cal. Vanc.

In wing form this species is close to *H californica* Behr. differing however in maculation. The specimens of both species vary widely in ground color, in the distinctness of maculation, and in the course of the ordinary lines. The t. p. line however is constant, and serves to at once distinguish the species. In *californica* this line is inwardly oblique, and in the submedian space makes a long acute *inward* angulation, whereas in the present form, the line is nearly straight and the angulation is *outward.* It can not be confounded with either of the other described species and need not therefore be distinguished from them. Both sexes are in Mr. Hy. Edward's collection.

Helia borealis n. sp. Primaries glistening brownish black, immaculate. Secondaries paler also immaculate. Beneath dark ash-gray, immaculate.

Expands .75 inch.. 20 mm. *Hab.* Maine, N. Y., D. C.

A rather common species, closely allied to *lubricalis* but entirely immaculate and uniformly smaller. It belongs to the genus *Pseudaglossa* of Mr. Grote, which can be regarded only as a section of *Helia* (*Epizeuxis Hb.*)

H. occidentalis new var. of **lubricalis.** Larger, paler and more evenly colored than the type form. The white lines and shades are broad, distinct and sharply outlined; the usual dark lines obsolete, not darker than the ground color. Secondaries also paler throughout than in the type form.

Expands 1 4 inches. *Hab.* Calif. Vanc.

Although in general opposed to the wholesale creation of varieties, yet this form is so much larger, more evenly colored and so constant in the districts in which it occurs, that it is entitled to be considered at least as a geographical "race" or variety, and to remove all temptation to describe it as a species, I give it a varietal name.

Several specimens are in Mr. Hy. Edward's collection.

Zanclognatha obsoleta, n. sp. Above, uniform dark obscure brown or smoky. Primaries with a fairly distinct broad, upright, straight t.a. line, which is outwardly diffuse and indefinite, and inwardly determinate. The reniform is very faintly indicated by darker scales, and the t.p. line is traceable by minute blackish tufts of scales. S.t. line visible as a faint pale shade. Secondaries immaculate. Beneath, ash-gray, powdered with ochreous scales. Secondaries with a dark discal dot and two indistinct darker lines.

Expands 1.25 inch., 32 mm. *Hab.* Vermont.

A single ♀ specimen taken by Mr. C. H. Roberts at Manchester, Vermt., Aug. 3, 1883.

The species is nearly allied to *Z. lævigata* Grt. and may eventually prove to be a variety of it; the dark smoky-brown color and lack of definite markings, as compared with the bright yellow or ochreous colors and distinct maculation of the type, are quite within the range of variation in the genus: the maculation where traceable is identical with that of *lævigata* and the characteristic t.a. line is distinct in the specimen before me. It bears precisely that relation to *lævigata* that is borne by *minimalis* and *marcidelinea*, to *ochreipennis* and stands on the same footing as a valid species, with the two former.

Heterogramma palligera, n. sp. Pale clay yellow or luteous, transverse lines and terminal shade, darker. T.a. line narrow, outwardly curved, sinuate. T.p. line narrow, denticulate or crenulate; angulate outwardly on costa, thence slightly oblique to the inner margin. A dark transverse shade through the median space close to p.t. line. Through the dark terminal space, the pale s.t. line. Beneath paler, faintly reproducing maculation of upper side. In the ♀ the stigmata are obsolete; in the ♂ they are distinct, moderate in size, concolorous and broadly ringed with darker yellow.

Expands .80—.90 inches, 21—23 mm. *Hab.* Cal. Fla.

Varies considerably in depth of ground color, the males being as a rule darker than the females, and the Florida specimens, darker and somewhat smaller than those from California. It seems not uncommon where found, and flies early. One Florida specimen bearing the date March 3. Types ♂ and ♀ in my collection, others in Mr. Hy. Edward's (California) and Prof. C. V. Riley's (Florida) collection. The latter taken by Mr. Koebele.

This insect is perfectly congeneric with *Phalænophana rurigena*. Mr. Grote's genus being synonymous with that of M. Guenee, *Heterogramma* must be herafter used for both species.

Hints on Spring Collecting.

It is at this season that collecting under stones is most profitable. Many of the hybernated species are now found, and many species that have just left the pupa. Many minute forms also that at other seasons of the year are scarce, are now plentiful, if they are but carefully sought. When turning stones, do not select only the large ones, and if you see nothing under them, drop and leave them; but also take smaller, flat stones, pick them up and carefully examine the irregularities and crevices. Many species which escape observation in other ways are thus found. I have known a field to be gone over and nothing but common stuff found, and to be revisited half an hour later and dozens of good species collected. The reason was. the last collector was careful and searched closely; the first was in a hurry, desired to cover a large territory and found only larger and common forms.

Chas. Fuchs.

SYNOPSES OF COLEOPTERA.

In our previous volumes, the synopses have been almost entirely of *Cicindelidae* and *Carabidae.* The first family was completely monographed in our last volume: of the *Carabidae* there remain only a few of the large confused genera such as *Harpalus*, *Amara*, *Brachinus*, *Bembidium* and *Tachys.* These are in sad confusion, and need thorough study, which can not at present be accorded them; partly because Dr. Leconte's collection, which contains not only types, but also many new forms, is just now inaccessible for purposes of study; and also, because Dr. Horn who had agreed to do this work, is too much pressed with other business to devote that careful attention and study to these groups, which they demand. As soon as possible we will present synopses of these genera. Meanwhile Mr. Chas. W. Leng, who has for some years past made a study of the *Cerambycidae*, has agreed to prepare synopses in this family, and is to be considered authority for every thing not otherwise credited.

J. B. S.

The family *Cerambycidae*, which contains many of our most handsome and graceful insects has a peculiar habitus which renders them distinguishable at a glance. The fourth and fifth tarsal joints are anchylosed, the former being very small. The antennæ are filiform, usually long, often twice longer than the body, frequently inserted upon frontal prominences: front often vertical, large and quadrate: *pronotum* rarely margined: tibial spurs distinct.

Three subfamilies are recognized. distinguished as follows in the "classification".

Prothorax margined; labrum connate.................................. **Prioninæ.**
Prothorax not margined; labrum free.
  Front tibiæ not grooved.................................. **Cerambycinæ.**
  Front tibia obliquely grooved on the inner side.................................. **Lamiinæ.**

In the first sub-family, *Prioninæ*, the species are of large size, the colors uniform brown or black. The elytra are more or less coriaceous in appearance, becoming metallic and firmer in some of the genera with finely granulated eyes.

The tribes and genera into which this sub-family is divided in the classification may be distinguished as follows.

Eyes strongly granulated.
Prothorax pluridentate on the side.
Third antennal joint very long .... **ERGATINI.**
Head small .... **Ergates.**
Third antennal joint moderate, head large .... **MALLODONTINI.**
Mandibles ♂ not longer than head .... **Mallodon.**
Mandibles ♂ much longer than head .... **Stenodontes.**
Prothorax parcidentate at the side.
Metathoracic epimera parallel.
Antennæ filiform .... **DEROBRACHINI.**
Hind femora deeply sulcate beneath; punctured .... **Derobrachus.**
Hind femora less deeply sulcate; several short elevated ridges on inner surface .... **Orthosoma.**
Antennæ imbricate .... **PRIONINI.**
Thorax with three acute teeth at side .... **Prionus.**
Thorax with a single distinct tooth at side .... **Homæsthesis.**
Metathoracic epimera narrowed behind .... **TRAGOSOMINI.**
Prothorax very hairy; a single acute tooth at sides .... **Tragosoma.**
Eyes finely granulated .... **PŒCILOSOMINI.**
Prothorax trapezoidal; smooth; obtusely toothed near base .... **Sphenosthetus.**
Prothorax roughly punctured; acutely toothed behind middle .... **Elateropsis.**

ERGATES, *Serv.*

The only genus in our fauna belonging to the tribe *Ergatini.* Prothorax broad and finely punctured in ♂; narrower, sculpture very coarse, small teeth of lateral margin longer, more acute in ♀. Head small, eyes reniform; antennæ slender, 11 jointed, two thirds the length of the body in ♂, half the length of the body in ♀, rough with elevated punctures. Poriferous spaces on 3d joint small, inconspicuous, on the under surface near the distal end, gradually becoming larger, until the outer joints become entirely poriferous and irregularly reticulated with fine elevated lines, forming elongate cells, which are much less distinct or scarcely visible in ♂. Our single species is

E. spiculatus Lec. Journ. Ac. N. S. Phila., ser. 2, II, 1852, p. 110: Proc. Ac. Phil. VII. 218; Entom. Rept. 1857, p. 59, pl. 2. fig. 9a. ♂ *californicus*, White Longic., VII, 1, p. 37; Lacord. Gen. Col. 1869, p. 96, note 3; ♀ *spiculifer*, White loc. cit., p. 39.

The species is blackish or blackish-brown, the elytra of lighter brown and in ♀ frequently with yellowish transparent spaces. Length 1.75 to 2.50 inches, 55—63 mm. *Hab.* Pacific Slope and N. Mex.

STENODONTES, *Serv.*

The occurrance of *S. mandibularis* in Southern Florida requires the addition of this genus to our fauna. As defined by Serville (Ann. Fr. 1832, p. 173) it differs from *Mallodon* in the mandibles which are glabrous, and in the ♂ much longer than the head, and in the antennæ which are longer, reaching in the ♂ two thirds the length of the insect and about half in the ♀. The species is

S. mandibularis Fab. (*Prionus*), Syst. El. t. 2, p. 261; *exsertus* Oliv. Ent. t. 4, p. 17, pl. VIII, fig. 31.

The insect is dark brown, head and thorax more blackish, elytra somewhat paler. Easily distinguished by its very large size and the prominent mandibles of the ♂. The species is not common in collections, and is confined in our fauna to Southern Fla. Southward it is more common. Length 2.75 to 3.25 inches, 65—84 mm. *Hab.* Southern Florida.

MALLODON, *Serv.*

This genus also contains species of large size with the sides of the prothorax armed with numerous small teeth. The head is comparatively large, the eyes strongly granulated, distant, transverse, feebly emarginate. Antennæ are slender not exceeding half the length of the body in the ♂ and shorter in the ♀. The sexual differences are worthy of note. The prothorax in the ♂ is nearly quadrate, densely punctured, with smooth separate facets, while in the ♀ it is narrowed in front, more coarsely punctured towards the sides and uneven on the disk. The species may be distinguished by the following

SYNOPTIC TABLE OF MALLODON,

by G. H. HORN, M. D.

Mandibles nearly horizontal, prolonged in the ♂; sutural angle of elytra spiniform in both sexes.
  Metathoracic episterna with inner outline concave.................. **mandibularis.**
  Metathoracic episterna with inner outline straight.................... **dasystomus.**
Mandibles vertical, head somewhat deflexed; sutural angle spiniform ♂, rounded ♀.
  Thorax very decidedly serrate...... .... **melanopus.**
  Thorax rather crenulate than serrate.... .... **serrulatus.**

M. mandibularis Gemm. Col. Heft. X, 1872, p. 254; *gnatho* || Lec. Proc. Ac. Phila. 1858, p. 81; *dentiger* Lec. 1873, Crotch Check List, p. 82.

This species is recognized by Lacordaire as forming a distinct genus

Nothopleurus. In the ♂ the metasternum has two large densely villous spaces; in the ♀ the same portion is clothed with long soft pubescence. Color, uniform brown varying with individuals. From *dasystomus* its near ally, it differs further by the lack of the bright thoracic facets, by having the posterior angles obliquely and broadly emarginate, so that a prominent angle is formed before the base, and another at the base itself, and finally by the more slender mandibles having a strong tooth near tip and being only sparsely pilose internally. Length 1.25 to 1.75 inches, 30—45 mm. *Hab.* Southern States.

M. dasystomus Say, Journ. Ac. Phil. III, 326; Lec. Journ. Ac. Phil. 1852, 112; *melanopus* ‡ Hald. ♂ Trans. Am. Phil. Soc. X, 31; ? *degeneratus* Thoms. Revis. 95; *costulatus* Lec. Journ. Ac. Phil., ser. 2, II, 1852, p. 111; *spinibarbe* ‡ Hald ♀. Trans. Am. Phil. Soc. X, p. 31.

The color is much paler than in the preceeding; besides the differences noted under *mandibularis*, this species has the under surface of head much less deeply excavated, and the gular margins are much less elevated. The genæ also are emarginate, while in *mandibularis* they are broadly rounded. Length 1.25 to 2 inches, 30–50 mm. *Hab.* South. St.

M. melanopus Linn. Syst. Nat. ed. XII, p. 623; Oliv. Ent. IV, 66, p. 18. pl. 12, fig. 46; *crenulatus* Drury, Ill. II, Ind. I, p. 86, pl. 38, fig. 2; *cilipes* Say, Journ. Ac. Phil. III, 1823, p. 327; Lec. Journ. Ac. Phil. ser. 2. II, p. 111; *biimpressum* Hald, Trans. Am. Phil. Soc. X, 1847, p. 30; *simplicicolle* Hald. l. c. Dupont, Dej. Cat., 3d ed., p. 342.

In this species the tibiæ are densely ciliated on the inferior edge, and it was this character that induced Say to name the species *cilipes*. Otherwise sufficiently distinguished in the synopsis. The color is very dark brown—almost black, Length 1.75 to 2.25 inches, 45—55 mm. *Hab.* Florida, Ark. Tex.

M. serrulatus Lec., Proc. Ac. Phil. 1854, p. 82; Arcan. Nat. 1859, p. 127, pl. 13, fig. 5.

Readily distinguished from all the others by the characters given in the synopsis. Besides being crenulate rather than dentate, the margin of the thorax is also rather less reflexed than in the preceeding species. Length 1.75 inch., 45 mm. *Hab.* Texas. Color brown.

M. angularis Lec. Crotch Check List p. 83 is not described and must be dropped. It is *Stenodontes damicornis* Fab.

DEROBRACHUS, *Serv.*

Two species from the Southern States and California are contained in this genus. The form is more slender than in the preceeding. The mandibles are acute, horizontal, and alike in both sexes. The antennæ are 11 jointed, nearly filiform in the female, thicker at the base in the male. The sensitive pores commence on the outer half of the 3d joint, and cover the whole surface of the 4th and following joints, arranged in longitudinal grooves, separated by fine elevated lines. The narrow epipleural portion of the elytra is transversely striate, forming a stridulating organ upon which the edges of the hind femora grate to produce a sound. The 5th segment in the ♂ is broadly emarginate, the 6th visible and also emarginate, while in the ♀ the 5th segment is elongate and truncate but the 6th is not visible.

The species are seperated as follows:

Hind femora sparsely punctured; prothorax with three acute teeth........**brevicollis.**
Hind femora densely punctured; anterior tooth of prothorax double, sometimes divided..**geminatus.**

D. brevicollis Serv. Ann. Fr. 1832, p. 155; Hald Trans. Am. Phil. X, 1847, p. 31; Dej. Cat. 3d ed., p. 343.

The head and thorax are black, body testaceous brown; legs testaceous knees black. Elytra with three slightly elevated ridges. Length 2 to 2 25 inches, 52—58 mm. *Hab* Southern States.

D. geminatus Lec. Proc. Ac. Phil. VI, 1853, p. 233; Col. of Kans. 1859, p. 19, t. 2, fig. 12, ♀.

This species is easily distinguished, not only by its large size, but also by the double anterior tooth of the thorax. The elytra are entirely smooth except at the base, where a few indistinct rugæ are visible. Pectus covered with short yellowish hair. Length ♂ 1.5 to 2 25 inches, ♀ 2.5 to 2.9 inches, 62—75 mm. *Hab.* Texas to Lower California.

ORTHOSOMA, *Serv.*

This genus is represented by a single species:

O. brunneum Forst. Nov. Spec. Ins. 1771, p. 37; *cylindricum* Fab. Spec. Ins. I, p. 207; Oliv. Ent. IV, 66, p. 23, t. 1, fig. 6; *cylindroides* Gmelin ed. Linn. I, p. 4, 1818; *pennsylvanicum* De G. Mem. 1775 p. 99. t. 13, fig. 13; *sulcatum* Beauv. Ins. Afr. et Am. p. 526, t. 35, fig. 4; *unicolor* Drury, Ill. II, 1773, Ind. I, p. 83, t. 37, fig. 1; Casteln, Hist. Nat. II, p. 402.

The characters of this species are the same as given above for *Derobrachus* and in the table of genera The prothorax is tridentate and the color is light brown. Sexual differences may be found in the antennæ as in *Derobrachus* and in the 5th ventral segment, which is rounded in the ♀, but broadly truncate in the ♂ leaving the 6th visible. The beetle is common everywhere in the Atlantic States, from June to September, and is attracted to light. The larva is said to live in the rotton stumps of pine (Pack. Guide 495. f. 478) and is credited also with eating into the roots of grape vines and sometimes destroying them. Length .90 to 1.75 inch., 22—40 mm. *Hab.* Atlantic States.

Editor's Department.

Excursions. It has been the custom of the Brooklyn Entomological Society for several years past, to have an annual excursion or field meeting, early in spring. These excursions were so popular, and the attendance was so large, that for the coming season a series of excursions has been arranged, under the charge of various members of the Society. At the April meeting a programme was adopted, and the following dates and places were fixed upon:

May 11,	Staten Island,	Mr. A. C. Weeks.
" 30,	Clifton, N. J., (Annual Excursion)	Mr. J. B. Smith.
June 8,	Fort Lee, N. J.,	Mr. Geo. Gade.
" 22,	Rockaway, L. I., (Sea shore collecting)	Mr. J. B. Smith.
July 4,	Clifton, N. J.,	Mr. Geo. D. Hulst.
" 6,	Flatbush, L. I.,	Mr. F. Tepper.
Aug. 17,	Fordham and West Farms, N. Y.	Mr. Geo. Gade.

The first excursion, under the charge of Mr. Weeks, will be to Garrettson's Staten Island. Leaving N. Y. from Foot of Whitehall St. (South shore) at 9 A.M. The collecting will be in the woods to the South of the R. R. Station.

The second excursion, May 30, is the annual field meeting of the Society, and will be under the charge of the President, Mr. J. B Smith. Leave N. Y. via Erie R.R. on the first train *after* 8 A.M., and the collecting to be done in the fields, woods, and shrubbery to the south east of the R.R. station. Other dates will be published in a future number. From the interest manifested, it is expected that the attendance at these field meetings will be large, and all persons interested in Entomology are cordially invited to attend, and further and more particular dates, as to these excursion, will be promptly and cheerfully given to all desiring same.

The Butterflies of Maine, by Prof. C. H. Fernald, designed for the use of the students in the Maine State College, and the farmers of the State. This book, of 104 pages, in pamphlet form we have just received from the author. It contains a synoptic table for the determination of the genera and species, and descriptions of the imago. and where known, the larval stages of the butterflies known to occur in Maine. It is very well written and is of use not only for the limited public mentioned in the title, but also to all New England Lepidopterists. A commendable feature is, the accentuation and division into syllables of the scientific names. Almost each collector has a different pronounciation of a given name, and uniformity is very desirable. This is a step in the *right* direction.

A less commendable feature, and to our view a step in the *wrong* direction, is the adoption of "common" or "popular" names for the butterflies; introducing such names as "The Mormon" for *P. zabulon*; "The sleepy dusky wing" for *T. brizo*; "The Wanderer" and "The Piebald" for *F. tarquinius* etc. etc. We are sorry to see that Prof. Fernald has given any countenance whatever to this practice.

Explanation of Plate I.

1 Femoral spur (*Gonyodon*) of *C. coccinata* ♂.
2 " " (") " *Parallelia bistriaris* ♂.
3 " " (") " *C. Sappho* ♂.
4 " " (") " *C. parta* ♂.
5 " " (") " *Drasteria erechtea.*
6 Clasper of ♂ *C. piatrix.*
7 " " " *C. Aholibah;*
8 " " " *C. nubilis.*
9 " " " *C. Ilia.*
10 " " " *C. neogama.*
11 " " " *C. Epione.*
12 " " " *C. relicta.*
13 " " " *C. cerogama.*
14 Frenulum of ♂.
15 Frenula of ♀ (usual form).
16 " " " *C. gracilis* (occasional).
17 Primary wing of a *Catocala* showing typical ornamentation. *a.* basal half line (b. line). *b.* transverse anterior line (t.a. line). *c.* basal dash. *d.* costal dots. *e.* reniform. *f.* sub reniform. *g.* transverse posterior (t.p.) line. *l.* M. of t.p. line. *h.* subterminal (s.t.) line. *i.* terminal dots. *k.* apical dash. Between base and t.a. line is the basal space. Between the t.a. and t.p. line is the median space, often crossed by a median shade, band, or line. Between the t.p. and s.t. line is the subterminal (s.t.) space. Between the s.t. line and margin is the terminal space.
18 Secondary of a *Catocala.* *a.* median band. *b* terminal band. *c* apex. *d* anal angle.
19 Antenna near base.
20 " " tip.
21 Palpus of *C. cara* ♂.
22 " " *C. elonympha* ♂.
23 " " *C. ultronia* ♂.
25 Tarsal claw of *C. elonympha.*
26 " " " *C. nubilis.*
27 " " " *C. desperata.*
28 " " " *C. amica.*
29 " " " *C. Belfragiana.*
30 " " " *C.* " var.
31 " " " *C. subnata.*
32 " " " *C. amatrix.*
33 Head of *C. ilia* from above.
34 Tip of abdomen of *C. ilia* ♂.
35 Head of *C. ilia* from front.

THE GENUS CATOCALA.

By Rev. Geo. D. Hulst.

In the Bulletin of the Brooklyn Entom. Soc., vol. III, pp. 2—13, 1880, was published an article entitled "Remarks upon the Catocalæ of N. A. North of Mexico with a catalogue of the species."

The study prefatory to the publishing of that article, led to an interest in the genus, which has resulted in continued effort to attain knowledge of these most beautiful insects. At the request of some of my entomological friends, the study during a few months past has taken a form looking to the present monograph.

The genus *Catocala* embraces insects which are among the largest, most showy, and most interesting of the Noctuidæ. The genus is one of the Northern Hemisphere, is largely represented in Europe, Asia and America, and very sparingly in the North of Africa. Our own species surpass all others in number, size and variability of coloration.

Of the *egg* of our species, we know little more than has been given us in the careful and very valuable observations of Prof. Geo. H. French of Carbondale, Ills. He has in "Papilio", and the Can. Ent., given the life history of *cara*, *amatrix* and *Ilia*. The eggs of these species very nearly agree in being spheroidal in shape,—grooved longitudinally with many furrows,—flattened at apex and base, the flattened surface at the base being somewhat the larger. I have taken eggs from the abdomens of cabinet specimens of various species, (*nubilis*, *elonympha*, *ultronia*, *parta*, *lacrymosa*), and found them to agree, so far as I could judge, with the eggs spoken of above. The eggs remain unhatched, so far as Prof. French's observations go, until the following spring after being laid. With the possible exception of *nubilis*, I feel certain that no species is double brooded. Mr. A. Koebele of Washington D.C. obtained eggs of *Clintonii* in Florida, as early as March, but the larvæ did not emerge until the following year, in June, the eggs having been brought North mean-while. With regard to *elonympha*, all testimony leads to the conclusion that it is not double brooded. *Nubilis* is found at almost all times after early summer, and it may be true that more than one brood of it appears each year but I do not believe this at all probable. The insects under the observations of Prof. French remained in the egg state from about 180 to 250 days; those of *Clintonii* obtained by Mr. Koebele hatched only after 15 months had passed!

The eggs according to Mr. Koebele are laid in bunches of from 1 to 10 on the bark of the tree. Of course with their long exposure the large majority are destroyed by their enemies.

The *larva* is elongated, tapering towards both ends, is generally rounded above, and somewhat flattened below. The head is generally flattened, with the front nearly horizontal, so the mouth parts are projected forward, and is often divided at the apex. The abdomen is generally provided with protuberances on each segment; is largest at the 8th segment, which is marked generally with a dorsal lunule or protuberance, as is often the 11th. Generally the larvæ have curious scurffy fringes running in a substigmatal line, and coming next the flattened portion of the abdomen. Guenee seems to think they may serve the purpose of assisting the larva to cling more tenaciously to the surface upon which it rests. From repeated observations, I have been unable to see any such use made of them, and moreover they have no sucking disks, and seem to be devoid of muscular mobility. The larva may be said to have 16 legs, though according to Prof. French's observations, in the earlier stages of larval history, the two abdominal pairs are nearly obsolete, and in some species as in *micronympha*, (*fratercula* Grt.) they remain so, and in the early stages may not exist at all. In all the species the larvæ are semi loopers, hunching up the back in walking. The spiracles are as usual oval, fringed with hair within, and present, so far as I have observed, no variation.

The larva is arboreal and nocturnal. It lies concealed and quiescent during the day under or in the crevices of the bark, or in the grass at the base of the tree or shrub on which it feeds. I have noticed that the larva often returns to the same place of concealment day after day, following probably a silken thread left as a guide. The larvæ of the same species are somewhat variable during the different stages of development, the head being comparatively larger, the body flatter, the segments much more nearly of the same size, and the abdominal legs with a greater lateral projection in the earlier stages than in the final one. There is also a decided variation in coloration, and in the abdominal protuberances. In the same stage, there is in my observation much variation in the same species in the ground color, and in the size and distinctness of the markings and protuberances. I believe the larva is somewhat mimetic, and to an extent approximates the color of the bark of the tree on which it feeds. The larva has at least 4 moults during its history. Prof. French records that *cara* and *amatrix* go through 5 each, and *Ilia* through 4 only. This is certainly a very remarkable variation if it be the ordinary history of each of these species.

But there is sometimes variability in this respect in the history of some species; I learn from the very valuable report of Prof. Lintner, of Albany, N.Y., for 1883, that in some species of Lepidoptera the female goes through one more moult than the male in the larval state. It may be that this is the case with the *Catocalæ*.

Many collectors in this vicinity, myself among the number, have believed that the larvæ of some *Catocalæ* hibernated, as very early in the spring large larvæ were found. Prof. French has cleared up this mystery by showing that the larva emerges very early, and feeding upon the buds before the leaves have opened, becomes often nearly full grown before the leaves are much expanded. The development of the insect during the larval period is always rapid, rarely if ever reaching beyond a month.

The larva ordinarily pupates under the bark or at the base of trees, or under any convenient cover. It makes a slight cocoon of leaves or frass and silk. The larva of *nubilis* often goes just beneath the surface of the ground to pupate. The *pupa* is not more than ordinarily elongated, is cylindrical, without protuberances, and is covered with a bluish bloom. The pupal stage is comparatively lengthened, reaching in all cases as long as the larval period, and the pupa of *nubilis* hibernates.

The *imago* is almost strictly nocturnal in this country, though instances have been noticed of voluntary flight and feeding by day. The imagines generally hide during the day under cover of bark, shrubbery and grass, or sit exposed upon the bark of the trunk of trees, whose appearance they mimic with wonderful exactness. They are easily disturbed, but when disturbed, rarely fly to a great distance, often not further than the opposite side of the tree. They feed upon the honey of flowers, and the juices of fruit, and are readily taken at sugar.

Structure of the Imago.

The *head* is rather large and prominent. The mouth parts are of the normal noctuid character, with the *tongue* strong, well developed, and capable of reaching to the extremity of or beyond the thorax. The *front* is rather broad and full. The *clypeus* is somewhat variable, ranging from a nearly flat to a decidedly conical surface, but without any indentations. The *eyes* are prominent, round and naked. The *palpi* are heavy, well developed, quite erect, reaching well up the front. The first joint is short as compared with the second, and the third is variable, ranging from as long as the second, to only one-fourth or one-fifth its length. There is also a sexual variation, the third joint being in some cases slenderer and more produced in the female. The variation in this respect is in some species quite considerable.

The *antennæ* are ciliate, scaled and hardly fringed with hair above, and with slight tuftings of hair below, on each joint. The sexual variation is very slight, and this is also true of the specific variation. The joints are comparatively shorter and more compact towards the base, slenderer and more lengthened at the point. There is much variation in the number of the joints in the different species, ranging from about 60 to about 110. The number varies slightly in the same species, so it can not be made a basis for specific determination. The *ocelli* are two in number, situated near, and just behind the antennæ, and are black and prominent.

The *thorax* is rather stout and heavy, subquadrate, clothed with hairs intermixed with flattened scales, though in some species the hairs are almost wanting. It is somewhat more squammose in the male than in the female and is tufted posteriorly. The *patagiæ* are well developed, and reach with vestiture nearly or quite the length of the thorax; they are somewhat less appressed in the male than in the female.

In anatomical structure the thorax occupies a position between the typical *Noctuid* form, and that of the typical *Geometrid*. The proscutum is narrower, and more extended laterally than that of the typical *Noctuid*; the mesoscutum is much more slender and posteriorly extended; the scutellum of the mesothorax is shorter and posteriorly more rounded: the scutellum of the metathorax is shorter and broader laterally. I refrain from the discussion of the comparative anatomy of the thorax, beyond this, because my friend, Mr. John B. Smith, who has been somewhat of an inspiration to me in this line of research, is making a special study of this portion of the imago of the *Noctuidæ*, and I do not wish to anticipate his work. I will only say, that on the basis of thoracic structure, the affinities of the genus are as strongly with the *Geometridae* as with the *Noctuidæ*, thus carrying out what has already been evidenced in the larva and pupa by their general appearance and habits.

The *abdomen* is somewhat extended, conical or cylindro-conical, considerably keeled dorsally in *nubilis*, less in others, (*Clintonii* etc.) and in others not at all; the tendency being, in all cases, more marked in the female than the male. The abdomen is more or less tufted in all the species, on the anterior segments. The *spiracles* are as usual, oval linear. The *genital organs* are very prominent and marked in the male. There is a special and marked modification of these parts in the various species of the genus. The supra-anal clasper is narrowed and extended, and on the end is curved downwards, forming a strong corneous hook, laterally somewhat winged. In some species, this hook is more curved than in others. The lateral plates are subject to great and remarkable modifications. Except in *nubilis*, the clasper is independent of the plate itself, and consists of a strong corneous spur, rising from near the center of the plate, and varying very much in form. The commonest form is a somewhat flattened conical spur, curved inwards, pointed, divided below into two parts, (which are here contained in the membrane of the plate), extending to and supported by the strong borders of the plate itself. In *relicta* this spur is much shorter, stouter and more heavy; in *Epione* it is much longer, and more slender; in *Ilia* and *piatrix* it is yet longer, more slender and with a different curvature and shape; in *cerogama* it is very curiously flattened and curved; in *Aholibah* the modification is remarkable; the divided part is freed from the membrane of the plate, is greatly extended and curved, and the spur itself is almost obsolete as a spur. In *nubilis*, the spur, as well as the divided part, is enclosed in the membrane of the plate, and the clasper is formed by the projection of the spur beyond the edge of the plate.

So far as my observations have gone, the female genitalia correspond in form with those of the typical *Noctuid*.

From examination of cabinet specimens, I believe, that the eggs are not all fully developed when the imago emerges. The number of eggs probably runs up to as many as 400, laid by a single female. Prof. French had an *amatrix* lay 292.

The *fore wings* are large, broad, triangular, somewhat arched along the costa, more or less pointed and extended at the apex. rounded, and very generally undulate on the outer margin, somewhat concave on the inner margin, and suddenly narrowing near the base. They are somewhat more narrow, pointed, and squammose in vestiture, in the male than in the female. The *hind wings* are large, undulate on the outer margin, with rounded apex, and with rounded, almost obsolete anal angle. For the markings which are in the main common to all the species I refer to figs. 17 and 18 of plate I.

The *vestiture of the wings* shows a variation in the shape of the scales in some species, but I have not found the variation sufficiently marked to be of value in the determination of species or even of larger groups.

The *wings* are in *ornamentation* and *coloration* extraordinarily variable in the same species. In fact, in some species, there is nothing at all of these things which is not subject to wide variation. On the fore wings the ground color,—the color and limitations of the reniform and subreniform spots,—the transverse lines,—the subterminal line,—the basal and apical dashes; the shadings of the costal and inner margins and of the t. p. line and the reniform spot,—the shading of the basal middle and outer spaces, are inconstant. On the hind wings, the bands present great differences in width, outline, and color. In short, every thing seems to be inconstant in some species, and those that have very little variation, are few, and of these, the examples collected are few.

In *venation* the wings differ somewhat from that of the typical *Noctuid.* On the fore wings, the 5th venule is slightly more advanced towards the middle of the discal cell, showing again an affinity with the *Geometridæ.* The discal cell is very short, being less than one-half the length of the wing. On the hind wings, the venation is after the Noctuid type, save that the cell is remarkably shortened, being not more than one-third the length of the wing. The venation of both wings is given in figs. 17 and 18 of plate I.

There are, however, as relating to venation, some things which ought to have more than a passing interest to the student of systematic entomology. Upon the fore wings, we find extending inward from the outer margin between the 5th and 6th, and 6th and 7th venules, rudimentary venules, which however do not reach the outer margin of the cell. There is also a rudimentary vein reaching out from the base, dividing longitudinally the discal cell, and extending beyond it, to meet the one extending in from the outer margin of the wing. On the hind wing, the cell, which has generally, if not always been considered open outwardly, is really closed, though the cross vein is faint, and somewhat rudimentary. There is on this wing also, found a rudimentary vein, dividing the cell longitudinally, and extending towards, if not reaching the outer margin. With regard to the presence of all these, I have no guesses to make of a possible past or a possible future. But the presence of these rudimentary veins calls to our minds the venation on the one hand of certain of the *Bombycidæ*, and on the other of certain of the *Tortricidæ*, and suggests affinities which are somewhat surprising.

The hinds wings are furnished on the anterior margin, near the base with an organ, called the *frenulum*.

In the male. it fits in a membrane, projecting from near the costa, on the under side of the fore wing, underneath which, longitudinally, it moves freely. This however, is nearly, or quite obsolete in the female, and in my observation does not cover the projections of the organ.

It has been thought to serve the purpose of holding the wings together in flight; this end may be served; but in view of the modification of the organ in the female, it is more likely an instrument more particularly to keep the hind wing from getting above the fore wing. The frenulum in the male is a strong corneous spine. In the female, there are with but one exception in my observation. three spines, much slighter and weaker than in the male. I was much surprised to find how incorrect an idea existed among entomologists concerning this organ of the female of the *Catocalæ*. Mr. Strecker in his catalogue of the Butterflies and Moths of N. A. 1878. p. 34, speaking of the frenulum of *Catocala* says "simple in male, and forked or double in female." Mr. Grote, in the years gone by, sneered at another, who was in doubt as to the sex of a *Catocala* whose abdomen was wanting, saying in effect, that any one who had the least knowledge of the anatomy of the *Noctuidae*, would know that the frenulum was bifid in the female. And so late as August 1883, (Proc. Amer. Phil. Soc. XXI, pp. 135—36), he says of the *Noctuidae*, "they have a simple frenulum, which is divided, (not 'double') in the female." The facts are, so far as the *Catocalae* are concerned, the frenulum is simple and single in the male, but in the female it is not forked. divided, double, or bifid, but the only proper way to express it is that there are in the female three frenula;—for the spine is the frenulum, and there are three of these. There is an adaption of the wing to receive the spine; but the name must attach to the spine, and not to a section of the wing itself.

I found one ♀ *gracilis* with four frenula, but this. is the only instance of hundreds examined, that I have found among the *Catocalæ*. I have never seen one with two only. These frenula can not, it seems to me, be looked upon as specialized nervules, as in the female each one is set in a sort of a socket, and in no case is the organ a continuation of any nerve in the wing itself.

Of the frenula of the *Catocalae* females, the basal one is generally the shortest and most erect; the two others are of nearly the same length, and curve backwards till they run nearly parallel with the margin of the wing. In a few instances, I have found the frenula slightly bulbed at the extremity.

The *legs* are somewhat lengthened, robust and powerful. The *coxæ* are rather stouter and longer than those of *Agrotis* being one–third as broad as long. The *trochanters* offer no observed differences. The *femora* are rather long and slender, and somewhat flattened, laterally. They are generally, if not always, covered within with long hair, which on the fore and middle legs becomes exaggerated This is not a character special however to *Catocala*, but seems to be a tendency of the lower *Noctuidæ*. On the femur of the fore leg is an organ which seems heretofore to have escaped the observation of students of structural anatomy. I have found no mention made of it in the works of Guenee, Lederer, Herrich-Schaeffer, Burmeister or others. It is a special piece of armature, situated on the femur of the fore legs of the males only, near its juncture with the tibia, at the middle of the upper or frontal portion, and consists of a chitinized spine set in a socket. It is corneous, cylindrical, pointed at the apex, swollen in the middle, and narrow, almost pointed, at the base. It is ordinarily about one-half the diameter of the femur in length, and may be known as the *gonyodon*, (*gonu*, knee, and *odous*, tooth), or femoral spur. It is ordinarily hidden in the vestiture of the femur. Upon search I found it on the fore femora of the males of all the *Catocalæ*. It is also present in a number of the lower genera of the *Noctuidae*, though wanting, so far as I have observed, in nearly allied genera such as *Syneda*, *Ypsia* (*Homoptera*), and the *Deltoids*. In *Euclidea* it takes a peculiarly curved form. In *Parallelia bistriaria*, and *Agnomonia anilis*, I have found in the place of one, two of these gonyodons present. This organ is subject in the *Catocalæ* to considerable variation in form, as may be seen from the figures of the plate. What may be the use of it I will not venture to guess.

The *tibiae* are comparatively slender, though not lengthened. The *fore tibiae* present marked differences in armature, which seem to have heretofore escaped the attention of our systematists, and which divide the genus into two divisions of subgeneric standing; the one *Catocala* proper, having the fore tibiæ unarmed, the other, which I will call *Catabapta* (*kata*, beneath, and *baptos*, dyed), having the fore tibiæ always, and generally very heavily spinulated.

The *middle tibiae* apart from the pair of great spurs, are always spinulated; generally much more heavily in the *Catabapta*, than in the *Catocala* group.

The *hind tibiae* are sometimes spinulated, sometimes not. Always and generally heavily, in the *Catabapta*, not at all, or but slightly, in the *Catocala* group. Many of the fore tibiæ are heavily covered with long hairs on the inner side. So also on the middle tibiæ, which on the males, in many species form large tufts. This however, is simply a tendency, very frequently found among the lower *Noctuidae*. After diligent and repeated search, with a compound microscope, on scores of denuded legs, I have not yet found the faintest suggestion of the scent organs spoken of by Prof. Lintner in his Report, p. 71 as found "at the upper part of the second pair of tibiæ."

The *tarsi* present no special modifications. In length, as is usual, they vary as compared with each other. I have found a curious monstrosity in the tarsi of the fore leg of a specimen of *consors*. At the joint below the second segment from the tibia, two segments proceed, forming a double leg at the end.

The *claws* present marked and surprising variation. In the greater number of the species, they are single, rather stout, and curved strongly downward. From this they reach one way to the slender semicircular claw of *Messalina*, and the other way, to the form found in *nubilis*, *elonympha*, and *gracilis*, where the curve becomes almost rectangular on the outer edge, and on the inner side there is developed a thin angular membrane, (the counterpart of that in the claw of the lower *Noctuidæ*), giving a distinctly bifid appearance. There is also a difference in what may be called the heel of the claw. In some, (*nubilis*, *elonympha*, *gracilis*) it is obsolete; in *Messalina* it is strongly prominent. I refer to the proper figures of the plate.

POSITION OF THE GENUS.

In view of what has been already said, it will be seen that from almost every point of view, the genus occupies a position between the typical *Noctuid* and *Geometer*. In my opinion, it is nearer the latter, than the former. And while, on the basis of venation, it must yet be classed among the Noctuidæ, it ought to be placed closer to the foot of the list than it is; very close to, if not by the side of *Ypsia* (*Homoptera*), and its allies, and these with *Euclidea* ought to be almost, if not quite at the end of the *Noctuidae.*

LIMITATIONS OF THE GENUS.

The most of Lepidopterists probably are agreed, that many of the divisions called genera are artificial. But it is perhaps just as fully agreed, that this ought not to be the case, and that the effort should be, to free ourselves from this unscientific method as soon as possible. With all the gaps that exist in nature, there surely is no reason why, even though many genera must be very large, there should be the making of genera for accommodations sake. The basing of genera on comparative differences only, as is the case so largely in the *Rhopalocera*, the *Sphinges*, the *Deltoids*, and elsewhere, is only a confession of ignorance, and ought not to countenanced any longer. It may be well to try to map out in our divisions, the probable development of the past in nature, but in the *Lepidoptera*, this can, save in close allies, be only wildly guessed at. The history of nature in the *Lepidoptera*, since perhaps as far back as the Carboniferous age, has probably been downward in the main, not upward. The cataclysms of the past have broken the thread of kinship, beyond the possibility of recognition. And, (whatever our belief in evolution,) so far as history and experience go, nature is unchanging. It is wisdom we think, to map out as best we can, nature as we find it, and make divisions only as we find them in nature. Generic distinction should be based on structure only, and should extend till a break is found in nature. The genus *Papilio* is a case in point. Its species are very widely variant; but it is as impossible naturally to divide it, so far as present knowledge goes, as it is to divide nations naturally by parallels of latitude.

But what will constitute a natural distinction sufficiently marked to warrant a genus? Here is where the difficulty comes in. There is without doubt great loss, where genera are multiplied; there is hardly less loss, where they are too few. The middle path is, as in most cases, the safest. Let a genus have a good valid structural reason for existing, and let it be the duty of the one who affirms the need, to prove it, not the duty of the one who denies, to prove there is no valid ground for it.

On this basis, after thorough examination and study, though not without a consciousness. that in one case, much can properly be said against it, I have concluded to follow Mr. John B. Smith in his "Synopsis of the Noctuidæ of N. A.", Bull. Brooklyn Ento. Soc. Vol. V, July 1882, putting *Parthenos*, *Allotria*, and *Andrewsia*, under *Catocala*, as not generically distinct. Notwithstanding the suggestion of so eminent an authority as Dr. Speyer, that *Messalina*, (*Belfragiana*) is generically distinct from *Catocala*. and notwithstanding on this suggestion, Mr. Grote created the genus *Andrewsia* for it, I fail to see any good reason why it should be separated even subgenerically. The only basis of separation so far known is the shape of the fore wings: but the difference is so slight, that I am confident no one could tell the denuded fore wing of the male, from that of any *Catocala* of like size. It may be, when the larva is discovered, that it may be so aberrent as to warrant generic separation but not until then. If the larva agrees with the general form of the larvæ of the *Catocalæ*, the insect can be nothing but a true *Catocala*.

With regard to *Elonympha* there is not the slightest ground for a separate generic reference. Guenee gives as his reasons for retaining Hubner's division "the color of the wings beneath, the palpi, and the fact that the larva is not furnished with lateral fringes." Of the palpi, in another place, he says, "palpi very ascending,' arched, a little heavy, the second joint narrow, smoothly squammose, the third long, linear, sharp". The first point might serve for specific reference, never for generic: the second, concerning the palpi, has no standing whatever; after denuding and examining hundreds of palpi of different species, and making drawings of many with the camera, I am prepared to say the palpi do not differ from those of other *Catocalæ*, and in the points indicated are not more marked than some others (*amica*, *crataegi*, *praeclara* etc.). With regard to the third point, the larval fringes, this is likely true of others of the smaller species, and even if true of this alone, would have no generic or subgeneric value. *Allotria* has no excuse for remaining as a genus.

With regard to *Nubilis*, there is, I freely admit, valid ground for a difference of opinion. The coloration of the hind wings, at once is a mark, but coloration has not necessarily even specific value. The wings are slightly more pointed, but in no other case is this thought to be of generic or subgeneric value. The body of the female is strongly keeled, but this is a character in less degree of other *Catocalæ*. The insect hibernates in the pupal state, and often goes beneath the ground to pupate, but in no other genus, is this thought worthy a moments notice, as a basis for even subgeneric separation. These all afford no ground for any separation; but there is a marked difference in the genitalia of the male, unknown heretofore however, which may be by some thought a valid basis for generic reference. But structural differences which are sexual, should be very cautiously if ever allowed as a ground for generic separation. Differences, even greater, have not divided Acronycta, or other genera, and *nubilis* is not further removed from the normal form of *Catocala* in this respect, than is *Aholibah*, which no one would think of putting in another genus. *Nubilis* comes the nearest of the *Catoculae* to *Ophideres*, and were the tibiæ not spinulated might be congeneric with it. After all, ornamentation is the chief reason for the genus. It was so with Hubner in the case of both *elonympha* and *Parthenos*. Were the markings of the underwings like the ordinary *Catocala*, no one would think of generic separation. On the above grounds, I have retained all these groups, under the one genus *Catocala*. If any one does not consider my reasons sufficient, he has simply to take my subgenera as genera, and in place of *Catocala* make the following genera, with their respective species, *Catocalirrhus*, (*Parthenos* is a genus of the *Rhopalocera*), *Catocala* and *Catabapta*.

HISTORY OF THE GENUS.

The fathers of our science, Linnaeus, Cramer, Drury, Abbott & Smith, described the species known to them under the names *Noctua* or *Phalæna*. In 1802 Schrank gave the name *Catocala*, to these insects which have so striking a similarity to each other in their gayly colored underwings. Afterwards Hubner, after his fashion, divided these insects into as many sections as he could find superficial differences in coloration upon which to base them. Although these undescribed divisions have by many been recognized elsewhere in the *Lepidoptera* as genera, the most of his divisions of *Catocala* have never had any recognition whatever, as here he did not have the luck to hit on real differences, of which he knew nothing. Of the lot, *Parthenos* and *Allotria* alone lived, Guenee accepting them for *nubilis* and *elonympha*. Since Guenee's time these have been recognized, without investigation, till in 1882, Mr. John B. Smith, the highest authority in America on the subject, again merged *Parthenos* and *Allotria* with *Catocala*, on the ground that no structural differences warranted their separate existence. In 1883, Mr. Grote, as has been already said, on the basis of a suggestion of Dr. Speyer, created the genus *Andrewsia* for *Messalina*. But, as has been shown, this has no reason whatever for existing.

LIMITATIONS OF THE SPECIES.

From what has already been said of the inconstancy of the ornamentation and coloration of the wings it need not now be said, there is room for widely differing opinions concerning specific values. Some rules looking to determination can safely be kept in mind; first, that a species under differing conditions of food, temperature, and humidity, will show variations, and under these conditions, will breed true to the form thus necessitated; second, the existence of intergrades, properly proves specific identity; third, what is known to be true of one species, is a valid basis for determination concerning a kindred species. Under the first rule, we may legitimately expect the species west of the great plains to vary more than those east. It has been one of the marvels of Lepidopterology to me that just as soon as the Missouri River is reached, insects cease to vary, and every new form in that wonderful country must, by necessity, be judged a new species; while ordinarily with the humidity of Oregon, and the desert dryness of Arizona; the intense heat of the latter region, and the bitter cold of Montana; the high mountains of Colorado, Utah, and California, and the extreme depression of Southern California, it would seem constancy in the size and appearance of species would be impossible. The second rule is universal to all nature in its application, and it is the duty of those who claim intergrades are hybrids, to prove their claims. With regard to the third rule, we will explain; e. g. Prof. French has raised both forms of *amatrix* from the eggs of the same female; then the presence, or absence of a basal, discal, or apical dash, or shading, is never to be taken as having specific value, till it is proved to have that value by breeding. Again, it is known, beyond doubt, that *Verrilliana* varies in the color of the hind wings, from bright red to clear yellow. Then a simple difference from red to yellow in the coloration of the hind wings does not in any case, till proved to do so, warrant specific separation. The same may be said of the color of the fringes, the ground color of the primaries, the shading within the t. p. line or along the inner margin. Whatever is known to be true of one species, must when a correspondence takes place, be considered true of any kindred species.

The first *catalogue* of the American *Catocalæ* which can be so called is that given by Hubner, Verz. pp. 276–78. Although making many divisions, to which he gives names, he begins with the black under wings and ends with the small yellow ones.

The first *synopsis* of the species of *Catocalæ* of N. A., was made, so far as I can learn by Guenee, in his Noctuelites, Vol. VII, pp. 79–107. He there collected the descriptions of the past, described new forms, and arranged them in a synopsis, with the *Catocalæ* of Europe. In his arrangement, he places the red underwings first, then the white, then the black, then the large yellow, and finally the small yellow. He places *Parthenos* and *Allotria* before *Catocala.*

Walker in the Cat. Brit. Museum, Noctuelitæ 1193–1209, gives a synopsis of the American species by themselves. He follows the order of Guenee, and his list is incorporated by Morris in his Catalogue of the Noctuidæ of N. A.

In 1872, Mr. Grote published in the Trans. Amer. Ent. Soc. Vol. IV, pp. 1–20 a monograph of the genus *Catocala* and gave descriptions of all the species known to him. In this monograph he follows the order of the catalogue of Hubner. He gives as his reason for so doing (Can. Ent. IV, 164) "I inaugurate the genus with the black winged species from the consideration that such species are not found in other continents, and that in North America the genus attains its fullest representation. I allow them to precede the more typical specific forms such as certain of the red winged species and conclude with the yellow winged *Catocalæ*, as has been customary with regard to the European species."

In 1872, in his work "the Rhopalocera and Heterocera of N. A.", Mr. Strecker began to give descriptions, with colored figures of all the *Catocalæ.* The work follows no order whatever in the giving of the species, and, yet incomplete, has appeared only at irregular intervals; but it is the most notable addition to the literature of the genus which has ever appeared.

In 1875, Mr. Hy. Edwards issued in Proc. Ac. Sc. Cal., a monograph of the species of *Catocala* found on the Pacific Coast; and in the same publication, 1877, gave a new catalogue of the Pacific species.

Mr. Grote has published several catalogues of the species, the last appearing in 1882.

In 1880, the author of the present paper published Bull. Brooklyn Entom. Soc. a catalogue of the species. In this Mr. Grote's order of sequence was inverted, on the ground that the small yellow winged species seemed to follow naturally after *Syneda* and *Parthenos*, and the black ones ending the list, naturally led to *Spiloloma* and *Spintherops.* This catalogue was followed in a check-list, published by the Brooklyn Ent. Soc. in 1882.

In 1881 Prof. French issued for the use of pupils and students a "Synopsis of the *Catocalæ* of Illinois". In this, he follows the sequence established by Hubner and followed by Grote.

No attempt has been made, so far as I know, to bring together the descriptions of the larvæ of the various species. Abbott and Smith, and afterwards Guenee from unpublished drawings and notes by Abbott, gave the larvæ of various species, though the notes he made use of seem to have been regarded by Guenee as unreliable. Since then, detached descriptions have been given in the current periodicals. I have endeavored to gather all these below in their proper places.

In the determinations below I use the word *variety* to mean a local form, which breeds true to itself, but is yet known by intergrades, or breeding elsewhere, to be connected with the stem form of the species. E. g. *carissima* is in this sense, a variety of *cara*. Through the South, it continually breeds true to itself, as *cara* does northward; but there is a belt of territory where they intergrade.

I also give variety standing to marked accidental variations, which do not breed true to themselves, but which would not likely be easily referred to the stem form. E. g. *phalanga* is in this sense, a variety of *paleogama*. The more marked of the variations among the *Catocalæ*, though most not so marked as to be worthy varietal standing, have been named, and will be referred to in their places.

My hearty thanks are due, and are hereby given to Dr. Bailey, Messrs. Hy. Edwards, Neumoegen, Strecker, Tepper, and the American Ent Soc. for the examination of types. And to these, and many others for the examination and use of material and for assistance. And especially to Mr. John B. Smith, my very kind friend, for his constant encouragement, and his very many and helpful suggestions as to methods and lines of study, as also for his valuable work on the accompanying plate.

After some thought, I still persist in my opinion that the small yellow underwings should be catalogued first. It is true the claws would seem to demand they should be placed lowest in the list but *Syneda* must it seems to me precede *Catocala*, and these are altogether most closely allied to *Syneda* and its allies.

SYNOPSIS OF SPECIES.

I. Middle tibiæ only, spinulated.................. ....1—22
II. Middle and hind tibiæ spinulated. ....23—60
III. All tibiæ spinulated..... ....61—84

1. Secondaries yellow.

A. Median band wanting on secondaries.

1 Marginal band reaching inner margin ....**2 elonympha.**
2 Marginal band not reaching inner margin...........................**4 amica.**

B. Median band present.

3 Primaries yellowish at base; black between b. and t.a. line; median space yellowish; t.p. line distinct; s.t. space white near costa; s.t. line black, distinct, serrate...**6 minuta.**
4 Primaries light gray with greenish sheen; basal dash present; veins near apex lined with black; median band not reaching inner margin . ....**9 præclara.**
5 Primaries light gray; t.a. and t.p. lines nearly or quite coalescing near inner margin, and indistinct near middle; t.p. line edged outwardly with ferruginous especially at bend near inner margin......................**8 grynea.**
6 Primaries with large dark brown spot on median space along inner margin **7 Olivia.**
7 Primaries reddish brown; t.p. line distinct, strongly angulated; bend near inner margin slight; secondaries with median band strongly angulated near inner margin...**10 micronympha.**
8 Primaries dark gray with reddish; M of t.p. line with only the upper tooth; behind this the line almost straight to inner margin; secondaries with median band not reaching inner margin; outer band broken ....**11 similis.**
9 Primaries uniform dark gray without reddish; ordinary lines indistinct; secondaries median band narrow strongly rectangular ....**12 chelidonia.**
10 Primaries with median space white, blurred; lines almost obsolete; t.p. line edged outwardly with ferruginous; s.t. space and line distinct....**13 Amasia.**
11 Primaries white; lines waved, very sharply distinct...................**14 sancta.**
12 Primaries pale greenish gray; basal space dark; median light; basal dash present; secondaries with median band heavy returning to base......**15 dulciola.**
13 Primaries with lines heavy; M of t.p. line very much produced; t.a. and t.p. lines quite widely separated at inner margin; basal space and inner margin very dark.... ....**16 cratægi.**
14 Primaries as above, but ferruginous at base and beyond t.p. line; t.a. and t.p. lines nearly or quite coalescing near inner margin...... ....**17 blandula.**
15 Primaries reddish brown above; t.a. and t.p. lines approximating near inner margin...... ....**18 mira.**
16 Primaries smooth light gray; lines all clear; basal and slight apical dash; t.p. line at bend near inner margin returning to beneath bend; secondaries with median band not reaching inner margin; fringe clear yellow, black at end of veins..................................**28 verrilliana** var. **votiva.**

2. Secondaries red.

a. Median band of secondaries not reaching inner margin.

17 Primaries light ashen above, red beneath; median band middling broad .... **28 verrilliana.**

18 Primaries nearly black with broad longitudinal olivaceous median band; red beneath; median band of secondaries very narrow...... **29 ultronia** var. **Celia.**

19 Primaries white beneath............ ..**43 Briseis** vars. **semirelicta** and **grotiana.**

b. Median band of secondaries reaching inner margin.

20 Primaries white beneath..**43 Briseis.**

21 Primaries white beneath between the two black bands; red otherwise...**29 ultronia.**

22 Primaries red beneath..**30 coccinata.**

1. Hind tibiæ spined between the two pairs of spurs only.

A. Secondaries yellow.

23 Median band present............. ....**3 Messalina.**

Median band wanting.

24 Size small; primaries with close smooth vestiture; lines almost obsolete; basal dash wanting; reniform black, pyriform ....**20 nuptialis.**

25 Reniform annulate....................................**19 abbreviatella.**

26 Size medium; lines distinct; color uniform light gray...............**21 Clintonii.**

27 Size medium; t.a. line heavily shaded on costal half; reniform and t.p. line also shaded at costa.......................................**24 Amestris.**

28 Size large; primaries light bluish gray; lines distinct. M of t.p. line strongly produced; secondaries with median band curved even on both sides ....**34 parta** var. **petulans.**

29 Primaries, yellowish brown, squammose, lines strong; secondaries with median band irregular and marginal band broken..........**31 Ilia** var. **osculata.**

30 Secondaries with median band outwardly even, within continuing dark to base...**27 cerogama.**

31 Secondaries with two median bands; claws bifid............... .....**1 nubilis.**

B. Secondaries red.

a. Third joint of palpus normal in length.

32 Size very large; primaries with black shade from costa over reniform to beneath apex; subreniform russet; vestiture squammose, no basal dash ....**33 marmorata.**

33 Size large; primaries smooth bluish gray, apical and basal dashes present; M of t.p. line prominent; secondaries dull red ....**34 parta.**

34 Primaries white, heavily covered with black atoms and shadings; very squammose; no apical or basal dash; subterminal space white, distinct, serrate..................................... ....**35 unijuga.**

35 Lightly powdered with black; subterminal space white, serrate; subterminal line distinct; median band short...............................**36 pura.**

36 Primaries more bluish with russet at t.a. and t.p. lines and at reniform ....**37 Stretchii.**

37 Primaries of *Faustina*; secondaries of *Stretchii*....................**38 Rosalinda.**

38 Primaries close, even light gray; s.t. space bluish; secondaries in 6 following species bright red, median band short, somewhat broad......**39 Faustina.**

39 Primaries squammose; cream gray instead of bluish; subterminal space white..**40 verecunda.**

40 Primaries light gray heavily lined aud powdered with black; reniform black, subreniform white, terminal dots and s.t. dots suffused together.....**41 allusa.**

41 Primaries very light bluish gray, heavily powdered with black atoms; lines heavily lined with black....................................**44 Hermia.**

42 Primaries dark ashen, unicolorous, lines indistinct..................**42 Mariana.**

43 Primaries very dark brown and black, often reddish; s.t. space clear, strongly serrate..**45 electilis.**

44 Primaries uniform light brown, lines distinct, reniform strongly lined or clouded with black, often quadrate...............................**46 Luciana.**

b. Third joint of palpus very short, size large to very large.

45 Primaries rich dark brown; secondaries bright rosy red.................**48 cara.**

46 Primaries light brown, lines distinct; secondaries with discal spot below, also red at inner margin, but not covering half the wing.............**49 amatrix.**

47 Primaries gray or cream brown, lines often indistinct, secondaries with median band narrow lengthened, below, red along inner margin, the red covering more than half the wing..................................**50 junctura.**

48 Primaries rich maroon brown, secondaries somewhat brighter red than *junctura*...**51 babayaga.**

49 *c. Secondaries orange red*...**31 Ilia.**

50 *d. Secondaries black*..**53 tristis.**

2. Hind tibiæ spined between and above the two pair of spurs.

A. Less than 5 spines above.

a. Secondaries yellow.

51 Small, primaries white beneath, between the two black bands..........**5 gracilis.**

Medium size, yellow beneath.

52 Primaries very light gray, lines light, indistinct....................**22 Frederici.**

53 Primaries dark gray, lines very heavy, median band of secondaries very irregular, marginal band with three large scallops within............**25 consors.**

54 Primaries yellowish or reddish brown, lines distinct; median band of secondaries with angle near inner margin, fringes yellow.............**26 Delilah.**

55 Primaries even gray; secondaries with outer yellow space even on both sides...**47 concumbens** var. **Hillii.**

b. Secondaries rosy red.

56 Primaries light even gray...**47 concumbens.**

57 *c. Secondaries black with white median band*........**52 relicta.**

B. More than 5 spines above.

58 Secondaries bright yellow...**23 illecta.**

59 Secondaries violet red..**32 Aholibah.**

60 Secondaries black...**54 Epione.**

1. Secondaries yellow.

61 Primaries black .... 55 **antinympha.**

62 Primaries unicolorous smoky gray; lines light but distinct; secondaries with yellow band narrow; base dark .... 56 **serena.**

63 Basal and median spaces unicolorous reddish brown or blackish; outer space lighter, unicolorous .... 57 **badia.**

64 Primaries rich reddish brown; secondaries with median band and margin broad .... 58 **muliercula.**

65 Primaries light clear gray; lines light but distinct .... 59 **habilis.**

66 Primaries blue gray, sprinkled with black; t.p. line edged outwardly with russet; subterminal black band distinct .... 61 **paleogama.**

67 Large; primaries smooth even; dull or bright light gray with considerable russet; M of t.p. line strongly produced .... 62 **neogama.**

68 Very large; like *neogama* but with some squammoseness and with lines more spreading .... 63 **subnata.**

69 Primaries dark brown; lines distinct; M of t.p. line produced; beneath with margin and fringes dirty white .... 64 **piatrix.**

70 Primaries with costal half of basal space very dark, the rest of the wing light fawn or olive with reddish brown; beneath outer border and fringes yellow .... 65 **nebulosa.**

71 Secondaries orange red .... 60 **innubens.**

2. Secondaries black.

72 Small; smooth light gray; lines indistinct .... 66 **Judith.**

73 Medium size; primaries blue gray, narrower than ordinary; no basal dash; fringes of secondaries white .... 68 **dejecta.**

74 Primaries light gray with just a shading of blue; reniform light russet within also russet beyond t.p. line; basal and often apical dashes present; fringes pure white .... 69 **retecta.**

75 Larger; primaries light gray with a general ferruginous shading, fringes dirty white .... 70 **luctuosa.**

76 Large; primaries light bright gray, basal dash present; t.a. line heavy on costal half; shading from costa across reniform to below apex; t.p. line clear, heavily marked; faint indication of white median band on anterior margin of secondaries; fringe pure white .... 71 **vidua.**

77 Very large; light squammose gray, no basal dash, reniform russety, russet band beyond t.p. line, heavy black dash from costa over reniform below apex .... 72 **maestosa.**

78 Large; primaries dark gray with blackish shading; heavily powdered with black, fringes white, black at end of veins .... 73 **lacrymosa.**

79 Primaries white, reniform black .... 74 **Sappho.**

80 Primaries dark dusky brown with russet shading; lines indistinct; fringe whitish, black at end of veins .... 75 **Agrippina.**

81 Primaries smooth light even gray; lines light but distinct .... 67 **Robinsonii.**

82 Primaries with inner margin dark, basal dash present, parallel on anterior part with inner margin; one white band beneath fore wings .... 76 **insolabilis.**

83 Primaries not black along inner margin; basal dash when present running outward towards middle of outer margin; two white bands beneath .... 77 **Angusi.**

84 Primaries uniform smoky or dark gray; subterminal space lighter; M of t.p. line with lower tooth much the smaller .... 78 **obscura.**

CATOCALA, *Schrank*, (*cat-O-cal-a*).

(*Kata* beneath, *kalos* beautiful.)

Parthenos, Hub. Verz. p. 278, Guen. Noct. 3, 79, *Catocalirrhus*, Andrews, C.E. 9, 20, *Allotria*, Hub. Verz. p. 280, Guen. Noct. 3, 36, *Andrewsia*, Grt. List 1883, p. 41, *Ephesia*, Hub. Verz. p. 278, *Corisce*. Hub. Verz. p. 278, *Eucora*, Hub. Verz. p. 278, *Asitotes*, Hub. Verz. p. 277, *Eunetes*, Hub. Verz. p. 276, *Lamprosia*, Hub, Verz. p. 277, *Mormonia*, Hub. Verz. p. 276.

§ CATOCALIRRHUS, *Andrews*.

1. **nubilis**, Hub. (*Parthenos*) Samml. 2, f. 3, Verz. 2737, Guen. Noct. 3, 80, Walk. C.B.M. 1179. Head rather small, thorax dark ashen, a black line in front, strongly tufted behind; abdomen dark gray above, lighter below, strongly keeled dorsally; fore wings pointed, deeply scalloped outwardly, much rounded, color dark ashen; basal and t.a. lines distinct, geminate; t.p. line obsolete; beyond a submarginal line, slender, much angulated; a blackish, somewhat triangular apical dash present; reniform large, bounded on either side by a light band, starting from costa, the outer reaching to outer third, the inner parallel, reaching to inner margin; these are often nearly white, and coalesce behind reniform; subreniform obsolete; hind wings bright yellow, with two median black bands, irregular, parallel; discal lunule within strongly marked, marginal band toothed both sides, fringe yellowish. Expands 50–70 mm. Found throughout the East and Colorado.

Of the *larva*, I have seen no description. I have often found it, but can say no more than that it is dark brown, *Catocala* like in general appearance. It pupates beneath, or just at the surface of the ground. Food, the common locust (*Robinia pseudacacia*).

§§ CATOCALA, *Schrank*.

2. **elonympha**, Hub. (*Allotria*) Hub. Zutr. 29, 30, Verz. 2748, Guen. Noct. 3, 1369, pl. 15, f. 11.

Thorax light gray, with tinge of yellowish; abdomen with yellowish more marked; primaries with lines distinct, basal space dark, beyond t.a. line light gray often almost white to reniform, beyond dark gray; reniform distinct, subreniform obsolete, M of t.p. line hardly suggested, s.t. white line distinct. secondaries rather dull yellow, median band wanting, marginal band broad, indistinct, but even on inner margin, extending to anal margin. Beneath, wings dull, indistinct, yellowish, primaries with reniform black, beyond an even, narrow, curved black line, also a broad marginal line; secondaries with discal spot, and 3 even curved bands, 2 inner and narrow, 1 marginal and broad. Expands 40–45 mm. Habitat East and South.

The *larva* according to Guenee as based on drawing of Abbott is gray white, with a roseate tint; without fringes; variously marked with brown, and with a substigmatal brown line; the back of the larva remains hunched in repose. It feeds some say on Walnut, others on a species of Glycine.

3. **Messalina,** Guen. Noct. 3, p. 107, Walk. C.B.M. 1209, *Belfragiana*, Harv. Buf. Bul. 2, 281, *Jocasta*, Strk. Rho. & Het. p. 107, Grt. Trans. A. Ent. Soc. 4, 19.

Primaries of an even violaceous gray, with all the anterior half lightened with pale gray upon which scarcely traces of the two lines show themselves; these are flexuous, not angulated, nearly parallel, and very approximate posteriorly, and to the reniform which nearly reaches the bend of the t.p. line; secondaries of a pale ochre yellow, base a little dusky, without median band, but with a wide marginal band continued to both borders, and having a single sinus not far from anal angle; beneath paler, with traces of a median band; abdomen slender, acute, brown beneath; thorax gray, with a brown collar. Expands 50—55 mm. Habitat Kansas to Texas.

Mr. Chas. Oberthür, of Rennes, France, to whom Guenee's types came, informs me that when they came into his posession, all were found to be destroyed beyond the possibility of recovery by the larvæ of *Anthrenus*. So no identification can be made of any of Guenee's American species described from imagines, from the the types themselves. All have however heretofore been identified except *Messalina* and *micronympha*. He gives a figure of *polygama*, which easily shows it has heretofore been incorrectly identified. *Connubialis* heretofore not identified, was described from a colored drawing of Abbott which is now, I understand, in the British Museum. There is no doubt in my mind that the above identification of *Messalina* is correct. We have no other species without median band in America, except *elonympha* and *amica*, both of which Guenee knew. And the rest of the description is always at least fairly accurate, except that Guenee states that the marginal band reaches the anal border. Mr. A. G. Butler first called my attention to the fact that this is often the case in Kansas specimens.

4. **Amica,** Hub. (Am-I-ca), *Corisce amica*, Hub. Zutr. 57, 58, *Androphila*, Guen. Noct. 3, 106, Grote, Trans. Am. Ent. Soc. 4, 18, *Lineella*, Grt. Trans. Am. Ent. Soc. 4, 18.

Primaries pale gray, the lines fine, not very evident, the t.a. line the more heavily marked; a dark shade running from costa through reniform to below apex; slightly brown beyond reniform; t.p. line dentate, with M not prominent; subreniform indistinct; s.t. space whitish, serrated; secondaries bright yellow, varying to pale yellow, without black median band; marginal band broad, broken near anal angle, with black dot beyond marking its continuance, or without this. Beneath on hind wings the median band is evidenced. Expands 40—45 mm. Habitat East and South.

Appears very early in the season. *Lineella*. Grt., differs from the typical form in being somewhat darker, and lacking the apical dash.

Var. **Nerissa,** Hy. Edw., Bull. B'klyn. Ento. Soc. 3, 61.

This variety from Texas, has the fore wings very dark, almost black.

Larva, Guen. Noct. 3, 106. Coquillett Papilio 1, 7. Body greenish gray or yellow; a light dorsal, a dark sub dorsal, and a dark broken stigmatal stripe; the two anterior pairs of abdominal legs partially aborted. On the 8th segment is a protuberance, and in Abbott's specimen, described by Guenee, another sharper and turned backwards on the 11th. Head gray, with two white spots. Length 1.25 inches. Food plant Oak.

The descriptions above referred to very materially differ.

5. **gracilis**, Edw. Trans. Am. Ent. Soc. 2, 511, Grote l.c. 4, 17, Grote Can. Ent. 6, 169.

Primaries light gray, more or less clouded with blackish on the outer and inner margins; transverse lines indistinct; t.p. line edged outwardly with brown; s.t. space clear gray; reniform gray, with a brown ring; secondaries deep yellow, band narrow, curved, terminating abruptly at some distance from the inner margin; border broad, interrupted, with spot near the angle. Expands 45 mm. Habitat South and East.

Var. **sordida**, Grt. Can. Ent. 9, 170. Dark hoary suffused blue gray, without basal streak on secondaries.

6. **minuta**, Ed. Trans. Am. Ent. Soc. 2, 512, Grote l.c. 4, 17.

Primaries dark glossy brown; transverse lines distinct; b. line sharply toothed; t.a. line arched; median band generally narrow, connecting with shade along inner margin; border interrupted but with anal spot. Expanse 40—50 mm. Eastern and Middle States. Food plant, Locust. A variable species, the variations differing very much in general appearance from each other.

Var. **parvula**, Edw. Trans. Am. Ent. Soc. 2, 511, Grote, Trans. Am. Ent. Soc. 4, 17. Primaries light brown; inner margin black.

Var. **mellitula**, Hulst. Base and median space olivaceous, with a brownish shade; reniform obsolete; subreniform annulate; space from b. line t.a. line jet black; subterminal space near costa, white; outer third darker than median space.

7. **Olivia**, Hy. Edw. Bull. Brookl. Ent. Soc., p. 295.

Size of *grynea*; primaries olivaceous; on the internal margin, and running nearly to the middle of the wing, covering the space of the subreniform spot, is a large sub-oblong brown patch, narrowest anteriorly, not reaching the base of the wing, and toothed posteriorly; basal line indistinct; t.a. line quite distinct; t.p. line obsolete, save at costa, reniform faintly defined; secondaries orange yellow; the median band is rather narrow, constricted in the middle, and joined to a black clouded streak, which runs along the abdominal margin to the base; marginal band interrupted. Thorax olivaceous, abdomen orange brown, darkest posteriorly, with a small longitudinal white spot at base. Marginal band beneath, continuous. Expands 45—50 mm. Habitat Texas.

Very rare. Has the appearance of being an aberration.

8. **Grynea**, Cram. (gryn-E-a) *Phalæna grynea*, Pap. Exot. 3, 29, pl. 208, f. H, *Ephesia grynea*, Hub. Verz. 2732, *Noctua grinea*, Oliv. Ency. Meth. 292, 206, *C. polygama*, Guen. Noct. 7, 105, pl. 16, f. 2, (?), *nuptula*, Walk. C. B. M. 1205, *grynea*, Grt. Trans. Am. Ent. Soc. 4, 16.

Primaries pale smooth and close dull glaucous gray; all the lines often obsolete, save at costa; sinus of t.p. line very deep, the line closely approaching the t.a. line at inner margin; t.p. line outwardly, and behind sinus strongly marked with ferruginous, as are the costal dots; secondaries deep yellow, median band angulated, recurrent to base; border broken or not. Expands 45—55 mm. East and South.

The description of *polygama*, Guen., seems to fit this species; the figure, which is poor, seems more like var. *Alabamæ*; neither description nor figure approach the insect identified as *polygama* by Grote.

Var. **Alabamæ**, Grt. Proc. Acad. Sci. Phil. 1875, 427.

Primaries wanting the ferruginous shadings. After examination of type, and other specimens, I have no doubt of the correctness of this reference.

Aber. **constans**, Hulst. Grote, Can. Ent. 13, 35. Secondaries black, except a yellow spot at base, and two others near middle of wing.

Larva: Koebele, Bull. Brookl. Ent. Soc. 4, 22, Coquillett, Ills. Rep. 10, 184. Head dark with two whitish lunules near summit; these edged behind with reddish; body silver gray, with reddish shading, the latter more marked near head; a prominent rust red protuberance on 11th segment; summit of legs red. Food plant Apple and Plum.

9. **præclara**, Grt. & Rob. Proc. Ento. Soc. Phil. vol. 6, plate 4, f. 4.

The size of and much like *grynea*, but primaries with lines distinct, with less ferruginous, t.p. line with stronger M, and smaller sinus, and the general color with a greenish sheen; veins lined with black near apex. Secondaries with marginal band broken. Found Eastward.

10. **micronympha**, Guen. Noct. 3, 102, Walk. C.B.M. 1204, Grote, Trans. Am. Ent. Soc. 4, 15, *fratercula*, Grt. & Rob., Proc. Ent. Soc. Phil. 6, 24, pl. 4, f. 3, Trans. Am. Ento. Soc. 4, 17, Streck. Rho. Het. p. 37, pl. 5, f. 8. *Atarah*, Streck. Rho. Het. p. 97, pl. 11, f. 10, 11.

Primaries chestnut brown, varied with whitish gray and blackish; median lines distinct, nearing below; M of t.p. line strong, the inferior tooth smaller, sinus very small; a black dash from costa, covering reniform, and reaching to below apex; s.t. line whitish, undulate, nearly perpendicular; secondaries ochrey yellow, median band narrow, angulated, returning to base along margin; border broken. Expands 40 to 55 mm.

An extraordinarily variable species. *Atarah* is slightly lighter than type form.

Var. **Jaquenetta**, Hy. Edw. Bull. Brookl. Ento. Soc. 3, 60. Primaries olivaceous, lines indistinct; a dark shading towards apex.

Var. **Timandra**, Hy. Edw. Bull. Brookl. Ento. Soc. 3, 60. Primaries sordid white, lines distinct; secondaries with median band narrow.

Var. **Hero,** Hy. Edw. MSS. Primaries with large white spot at base.

Var. **Gisela,** Meyer (Gis-E-la). Bull. Brookl. Ento. Soc. 2, 96. Primaries black to t.p. line.

Larva; Coquillett, Papilio 1, 7. Head light gray, bordered above and on sides with black; body ashen gray; the dorsal space dark gray, bordered outwardly with a row of piliferous spots; a stigmatal row of black spots also; there is a slight prominence on 8th segment; the two anterior pair of abdominal legs smaller than the others, in specimens brought by Mr. Koebele from Florida, almost obsolete. Length nearly 2 inches; food plant, Live and Burr Oak.

11. **similis,** Edw. Proc. Ent. Soc. Phil. 2, 511, Grote, Papilio, 1, 159, Can. Ent. 9, 169, *amasia*, Ab. & Sm. Lept. Ga., 2, 179, pl. 90 lower figure, Guen. Noct. 3, 103, *formula*, G. & R. Proc. Ent. Soc. Phil. 6, 27, pl. 1, f. 3.

Primaries gray, clouded with brown and black; lines distinct; t.a. line edged inwardly, t.p. line outwardly with brown; t.p. line angulated with one angle beyond reniform in place of M, then nearly straight to sinus, which is very small; reniform pyriform light; subreniform annulate; triangular light patch at apex, along costa; secondaries bright yellow; median band curved, nearly even, short; border broken. Expands 45—55 mm. Found East and South. Foot plant, Oak.

Var. **Aholah,** Streck. Rho. Het. p. 96, pl. 11, f. 8.

Primaries clear silver gray, with large black patch beyond reniform extending to apex.

Var. **Isabella,** Hy. Ed. Bull. Brookl. Ento. Soc. 3, 60.

Primaries sordid white; lines distinct; t.p. line edged with cinnamon brown.

Larva probably nearly the same as in *amasia*, thus deceiving Abbott in the identity of the two species. His figure makes it greenish gray, with protuberances on each segment, and with dorsal, subdorsal and stigmatal dark lines; also an oblique dark line on each segment.

12. **chelidonia,** Grt. Papilio 1, 159, Ill. Essay 67. pl. 4, f. 41.

Primaries even dark fuscous gray, somewhat hoary; reniform shaded with gray; subreniform stained with brown; lines indistinct, with course of *similis*; secondaries like *similis*, but with median band generally narrower. Probably representing *similis* in Arizona. Expands 40—50 mm. Found in Arizona. Food plant, Scrub Oak, (auct. Doll).

13. **amasia,** Ab. & Sm. *Phalæna amusia*, Lep. Ga, 2, 179, pl. 90, upper fig. *Noctua amasia*, Oliv. Ency. Meth. 8, 290, 200, *Cat. amasia*, West. Nat. Lib. 37, 205, pl. 26, f. 3, Walk. C.B.M. 1204, Grt. Trans. Am. Ent. Soc. 4, 16, *Cordelia*, Hy. Edw. Bull. Brookl. Ento. Soc. 3, 59.

Primaries sordid white; basal half line very distinct; t.a. and t.p. lines nearly obsolete, the latter when evident, scalloped, not angulated; median space sordid white; reniform blackish; t.p. line edged outwardly with cinnamon brown; subterminal line evenly, dentate; secondaries yellow; median band often hooked; border generally interrupted. Expands 50—55 mm. Habitat East and South East. Food plant, Pride of India or Oak. *Larva* probably as that of *similis* q. v.

14. **sancta,** Hulst, *connubialis*, Guen. Noct. 3, 103, *amasia*, Streck. Rho. Het. 77, pl. 9, f. 12.

Primaries clearer white than *amasia*, lines all strongly distinct, waved not angulated; t.p. lined edged outwardly with reddish; secondaries as in *amasia*. Expands 50—55 mm. East and South East.

These last two species have been much confused. Abbott's upper figure, from which Smith says his description was made, is undoubtedly the insect afterwards named *Cordelia* by Hy. Edwards. Guenee describes the lower figure of Abbott as *amasia*; but Abbott's description of the upper figure, holds good against that of Guenee. Mr. Grote identified the more southern form as *amasia*, and thus it is generally labelled in collections. Mr. A. G. Butler writes me, this latter is *connubialis*, Guen.: but the description does not fit, and it was described from a drawing, and so the name does not in any case hold.

15. **dulciola,** Grt. (dul-CI-o-la), Papilio 1, 5.

Primaries pale greenish gray, lighter to t.a. line; t.a. line heavy, evenly curved; t.p. line fine; terminal space a little darker; secondaries dark yellow, with wide black median band connected with base. Expands 50 mm. Taken in Ohio, and I have been told in Ills.

It appears very early in the season, as early as the 1st of June.

16. **cratægi,** Saun. Can. Ent. 8, 72, *pretiosa*, Lint. Can. Ent. 8, 121.

Primaries sordid white, lines distinct; basal space reddish or blackish, subterminal space some darker than median; much darker along inner margin; t.p. line with lower tooth of M small; a heavy dark shading from M of t.p. line to below apex; little or no reddish beyond t.p. line; secondaries deep yellow; median band heavy, returning to base; margin generally slightly interrupted. Expands 40—50 mm. Habitat N.E. U.S. and northward.

Larva; Saun. l. c. p. 72. Greenish ash color varying considerably; protuberances on each segment generally tipped with red; a marked protuberance on 8th segment dorsally, dull red in color; fringes rosy. Feeds on *Cratægus*.

Pretiosa I am unable to separate from *cratægi*. It has b. space black, the lines not coalescing near inner margin.

17. **blandula,** Hulst, *polygama*, Grt. nec. Guen. Trans. Am. Ent. Soc. 4, 15.

Same as *cratægi* except that on primaries the base is always reddish; the M of t.p. line with teeth nearly equal; the t.a. and t.p. line coalescing posteriorly, and the t.p. line edged outwardly with reddish; also somewhat larger.

Larva; Reed, Can. Ent. 2, 30, Saun, l.c. 8, 72. Like the larva of *cratægi*, but without the prominence to the protuberance on 8th segment, and with one on the 11th. Mr. Reed's description may be the larva of *cratægi*. Feeds on *cratægus*.

I feel strongly confident that *cratægi* and *blandula* are one species, notwithstanding the larval differences.

With regard to *polygama*, Guen , a glance at his figure Noct. 3, pl. 16, f. 2. will convince any one that this species could not have been intended. The primaries and secondaries are entirely different. The description accords with *grynea*, and the figure fits it as well as any species known to me. Moreover, Guenee in his synopsis, does not mention *grynea*, so it as such must have been unknown to him.

18. **mira,** Grt. Can. Ent. 8, 230; Noct. N.A. p. 70, pl. 4, f. 43.

General markings as in *blandula*, but with the whole upper surface marked with rich chestnut brown. Expands 50—56 mm. Habitat, Florida to Kansas and southward.

19. **abbreviatella,** Grt. Trans. Am. Ento. Soc. 4, 14, Noct. N.A. 66, pl. 4, f. 40. Angus, Papilio 4, 37.

Primaries smooth pale gray, darker terminally; t.a. line broad, black from costa ⅔ across wing, then obsolete; reniform annulate, black inferiorly; subreniform faint, black on inner margin; t.p. line faint or obsolete, not strongly angulated; secondaries bright yellow; median band short, curved, of nearly even width; border generally broken. Expands 45--50 mm Habitat Minn., Southward, and East to Ills.

Var. **Whitneyi,** Dodge, Can. Ent. 6, 125.

Primaries generally a brighter gray; t.a. line broadening inferiorly, before becoming obsolete, forming a triangular patch; reniform heavily black; border of secondaries generally unbroken.

20. **nuptialis,** Walk. C.B.M. 1206, Grt. Trans. Am. Ent. Soc. 4, 14, Buf. Bull. 2, 222, Angus, Papilio 4, 37, *Myrrha*, Streck. Rho. Het. p. 97, pl. 11, f. 12.

Primaries above, pale gray of *abbreviatella*, outwardly darker; all lines indistinct or generally obsolete; reniform black, subpyriform; secondaries a deeper yellow; otherwise as in *Whitneyi*. Expands 50—55 mm. Habitat Nebraska to Texas.

I feel entirely confident that *abbreviatella* will finally be determined as one with this species; but in the present status of the case I hesitate so to refer it.

21. **Clintonii.** Grt. Am. Ent. Soc. Phil. 3, 89, pl. 3, f. 4, Streck. Rho. Het. 35, pl. 5, f. 6, *Helene*, Pilate Pap. 2, 31.

Primaries pale smooth uniform gray; lines fine, but quite distinct. M of t.p. line generally pronounced; basal dash generally present, also black dash at sinus of t.p. line; veins black, subterminally; slight apical clouding; secondaries clear yellow; median band generally constricted near middle, not reaching inner margin; marginal band generally broken. Expands 55—60 mm. Habitat, East of the Mississippi.

Helene is somewhat darker than the type form, and varies in some minor details. The name can not stand however, as there is a *C. Helena* from Siberia.

22. **Frederici,** Grt. Trans. Am. Ent. Soc. 4, 14, Buf. Bull. 3, 217, Ill. Essay 70, pl. 4, f. 44, Can. Ent. 9, 168.

Primaries with obliterate markings, somewhat dark olivaceous, but overlaid with pale scales through which the lines are faintly evident; all the lines olivaceous blackish, t.a. line widely geminate, ordinary spots obsolete, t.p. line even, regularly scalloped; secondaries largely clear bright yellow, median band narrow, shortened, marginal band narrow, yellow outwardly, especially at apex. Expands 50—60 mm. Habitat, Texas.

23. **illecta,** Walk. C.B.M. 1205, Grote, Trans. Am. Ent. Soc. 4, 13, Can. Ent. 6, 199, *Magdalena,* Streck. Rho. Het. 93, pl. 11, f. 9.

Primaries pale even gray lightly shaded, lines fine and black, reniform small, t.p. line acutely dentate, the lower tooth much the smaller, in general the appearance of primaries of *concumbens*. Secondaries bright yellow, median band narrow, not reaching the inner margin, marginal band broken. Expands 60—70 mm. Habitat, Ills. and Neb. to Texas.

24 **Amestris,** Streck. Rho. Het. 96, pl. 11, f. 6, Hulst, Bull. Brookl. Ento. Soc. 3, 8, Papilio, 1, 215, *Anna,* Grt. Trans. Am. Ent. Soc. Sept. 1874, Buf. Bull. 2,222, Papilio 1, 161, *Westcottii,* Grt. Can. Ent. 10, 195.

Primaries ashen; t.a. line double, and from middle to costa very heavy, forming a diagonal black bar, t.p. line fine, but distinct, heavily edged near costa with black, reniform dark, heavily clouded. Secondaries bright yellow, median band narrow, not reaching the inner margin, marginal band broken, Expands 50—55 mm. Habitat, Neb. and Ills. to Texas. *Westcottii* has an unbroken marginal band.

The name of this, and of two other disputed species was settled beyond reasonable question by the letter of Mr. Chas. A. Blake, Papilio 1, 216.

25. **consors,** Abb. & Sm. *Phalæna consors,* Lep. Ga. 2, 177, pl. 89, Oliv. Ency. Meth. 8, 290, 197, Guen. Noct. 3, 99, Walk. C.B.M. 1204, Grote, Trans. Am. Ent. Soc. 4, 11, Streck. Rho. Het. 95, pl. 11, f. 3.

Primaries dark ashen, pulverulent, concolorous, lines black, very heavy, t.p. line with one large tooth, reniform large, black, with brown annulus within, subreniform small, lighter, heavily annulate with black, a brown band beyond t.p. line, then light gray. Secondaries bright deep yellow, twice constricted, yellow interspace narrow, sinuous. Expands 75—80 mm. Habitat, Penn. to the Mississippi and Southward.

Larva, Abb. & Sm. Lep. Ga. pl. 89, Guen. Noct. 3, 99. Larva elongated, of a clear ochrey gray color, without protuberances, clouded with blackish, with the side and joints reddish; head concolorous, with two black streaks. Food plant Myrtle (Myrica), and Bastard Indigo.

26. **Delilah,** Streck. (DEL-i-lah), Rho. Het. 96, pl. 11, f. 7, Hulst, Bull. Brookl. Ent. So 3, 8, Papilio, 1, 215, *adoptiva,* Grt. Trans. Am. Ent. Soc. Sept. 1874, Papilio 1, 161.

Primaries rich velvety yellow brown; basal dash present, t.a. line very heavy and dark, t.p. line dark and distinct, teeth prominent and broad, s.t. space somewhat lighter, s.t. line fine, strongly dentate. Secondaries bright yellow, median band rather narrow, generally rectangular at bend towards inner margin; marginal band broad, broken or unbroken. Expands 70—80 mm. Habitat, Neb. to Ills. and Southward, west to Arizona. Food plant Oak.

Var. **Desdemona,** Hy. Edw. Papilio 2, 15. Wood brown with lighter shades, reniform brown, subreniform lighter. Secondaries rich orange. Ariz. Food plant, Scrub Oak. (Doll.)

Var. **Calphurnia,** Hy. Edw. Bull. Brookl. Ent. Soc. 3, 59. Primaries with a greenish tint, lines faint. Secondaries wholly black, with the exception of a central cloud, a broad marginal band, and a central narrow band which are orange.

This species is, considering the numbers collected, a very variable one in both the primaries and secondaries. It shows well a tendency, common to all the *Catocalæ*, that as the median band narrows, it becomes rectangular at the bend near anal margin.

27 **cerogama,** Guen. (cer-OG-a-ma), Noct. 3, 96, Walk. C.B.M. 1202, Grt. Trans. Am. Ent. Soc. 4, 9, Streck. Rho. Het. 22, pl. 3, f. 0, *Bunkeri,* Grt. Can. Ent. 8, 230.

Primaries pale wood brown, t.a. line geminate, edged outwardly by a broad white shade reaching from costa to subreniform; subreniform diffuse, pale brown, with broad lighter band outwardly; t.p. line distinct. Secondaries black, with a narrow even yellow band. Expands 80—85 mm. Habitat, Eastern, Middle and Western States.

The variation named *Bunkeri* has slightly more brown over the median space of primaries, and the median band of secondaries narrower.

28 **verrilliana,** Grt. Can. Ent. 7, 185, Buf. Bull. 3, 217, Harvey, Buf. Bull. 3, 12, *Ophelia,* Hy. Edw. Bull. Brookl. Ent. S. 2, 95, l.c. 3, 58, *Violenta,* Hy. Edw. Bull. Brookl, Ent. Soc. 3, 58.

Primaries gray, shaded with blackish, a diffuse black basal dash, t.a. densely shaded with black, reniform small, yellowish,* more or less distinctly double ringed; t.p. line much as in *blandula.* Secondaries bright red, median black band narrow, quite even, not reaching anal margin, marginal band narrow. Expands 50—60 mm. Habitat, Cal. to Texas. Food plant. Scrub Oak.

Ophelia differs only in having somewhat heavier lines on primaries; *verrilliana* is always described with bright red secondaries; *Violenta* is somewhat larger and has more black.

Var. **votiva,** Hulst. Secondaries clear yellow. Habitat Arizona.

29. **ultronia,** Hub. *Eunetis ultronia*, Sam. 2, 26, 174, f. 347, 348, Verz. 1721, *Cat. ultronia*, Guen. Noct. 3, 89, Walk. C.B.M. 1197, Pack. Guide, 317, pl. 8, f. 4, Saun. Can. Ent. 12, 4.

Primaries light gray fawn, dark almost black along inner margin, basal dash and one at sinus present; a subapical dark shading; t.p. line fine, strongly dentated to sinus. Secondaries bright red, median band broad, rather even, reaching anal margin. Expands 60—70 mm. Habitat, East of the great Plains, and Texas.

Var. **Celia** Hy. Edw. Bull. Brookl. Ent. Soc. 3, 58. Median band of secondaries linear. Florida.

Var. **Mopsa,** Hy. Edw, l.c. 3, 58. Primaries nearly uniform brown.

Var. **Adriana,** Hy. Edw. l.c. 3, 57. Primaries nearly uniform fawn drab.

Var. **Herodias,** Streck. Rho. Het. p. 121. Primaries uniform dark smoky gray; denticulations of t.p. line very strong, and thus continued to inner margin.

Larva, Guen. Noct. 3, 89, Pack. Guide, 317, pl. 8 f. 4a, Saun. Can. Ent. 6, 147, l.c. 12, 4. Tapers to both ends, about 2 inches long, color from clear gray to very dark brown, with darker dots and reddish tubercles; on 8th segment a fleshy protubtrance, concolorous with body or reddish; a reddish lunule on 11th segment; two anterior pairs of abdominal legs in earlier stages much smaller than the others. Feeds on Wild Cherry, Plum, Dogwood and Live Oak.

30. **coccinata,** Grt. Trans. Am. Ent. Soc. 4, 6, Streck. Rho. Het. 21, pl. 3, f. 9, *Circe*, Streck. l.c. 121, Grt. N.A. Ent. p. 22.

Primaries clear cinereous, basal dash present, lines clear, distinct, the t.a. and t.p. lines approximating inferiorly, reniform whitish, annulate; subreniform white; a black dash at sinus, apical dash evident, veins marked with black near margin. Secondaries bright red; median band even, reaching anal margin. Expands 55—65 mm. Habitat East of the Miss. and Tex. *Circe* simply has the black on primaries more marked.

Var. **sinuosa,** Grt. Bull. Brookl. Ent. Soc. 1, 77, Can. Ent. 11, 15. Median band of secondaries linear.

Larva, Coquillett, Papilio, 1, 56. Body dark gray, a protuberance on 8th segment, and two slight ones on 11th; head gray, edged with black. Feeds on Oak.

31. **Ilia,** Cram. *Phalœna Ilia*, Pap. Ex. 1. 53, pl. 33. figs. B, C, *Eunetis Ilia.* Hub. Verz. 2717, *Noctua Ilia*, Oliv. Ency. Meth. 9, 266, 181, *Cat. Ilia*, Guen, Noct. 3, 91. Walk. C.B.M. 1199, Grt. Trans. Am. Ent. Soc. 4, 8.

Primaries dark cinereous, powdered with glancous scales, and shaded with black; basal dash present, t.a. line geminate, reniform whitish, with black internal ring, subreniform pale, subquadrate; M of t.p. line produced. Secondaries deep orange red, with irregular median band. Expands 80—90 mm. Habitat U. S., east of Rocky Mts. Olivier says it is found also in the Island of Jamaica.

Var. **uxor,** Guen. (nec. Hub.) Noct. 3, 92, Walk. C.B.M. 1199, Grt. Trans. Am. Ent. Soc. 4, 8, *umbrosa*, Worth., *confusa*, Worth., *decorata*, Worth., *obsoleta*, Worth., *duplicata*, Worth., *conspicua*, Worth. Primaries brown gray, reniform white.

Var. **Zoe**, Behr. Trans. Am. Ent. Soc. 3, 24, Hy. Edw. Proc. Cal. Acad. Sci. July 1875. Secondaries lighter orange. Cal.

Var. **osculata**, Hulst. Secondaries clear yellow. Ariz.

Larva. Koebele, Bull. Brookl. Ent. Soc. 4, 22, Caulfield, Can. Ent. 7, 208, French, l.c. 16, 12. Color of body varying from greenish gray to dirty brown, very largely given by numerous striations and lines; sometimes pinkish anteriorly; piliferous spots more prominent than usual, no protuberance on 8th segment, those on the 11th variable, head bilobed, greenish gray to brown. Length 2.5 to 3.5 inches.

Ilia is the most variable of all our species. In some cases the primaries are strongly mixed with blue. I am unable to separate Mr. Worthington's examples as proper varieties. If allowed, we must have at least 50 more names, to express the changes of this variable insect.

32. **Aholibah**, Streck. Rho. Het, 72, pl. 9, f. 5, Hy. Edw. Proc. Cal. Acad. Sc. July 19, 1875, p. 26. Primaries dark gray, strongly shaded with black, basal dash present, t.a. line geminate, diffusely black; M of t.p. line strongly produced, reniform clouded, subreniform small, nearly white, a band of brown beyond t.p. line; a faint subapical shading. Secondaries like *Ilia* with a shading to the ground color, generally quite violet. Expands 75—80 mm. Habitat, Cal., Northward.

A species subject to very considerable variation, and in many instances very closely approximating certain forms of *Ilia* both in fore and hind wings.

33. **marmorata**, Edw. Proc. Ent. Soc. Phil. 2, 508. Streck. Rho. Het. 73, pl. 9, f. 6, Hy. Edw. Proc. Cal. Acad. Sci. July 1875. Angus, Can. Ent. 9, 239.

Primaries diffuse light gray, with bluish shading, t.a. line edged inwardly with white, t.p. line heavy, M broad, but not greatly produced; a diffuse black shading running from costa, nearly hiding reniform and ending subapically. Secondaries rather dull red.

One of our largest, rarest, and most scattered species. Expands 100—110 mm. Habitat Northern U.S.

34. **parta**, Guen. Noct. 3, 84, pl. 16, f. 1, Grote, Trans. Am. Ent. Soc. 4, 6, Streck. Rho. Het. 38, pl. 5, f. 10, *perplexa*, Streck. l.c. 38, pl. 5, f. 11, *amatrix*. Walk. C.B.M. 1195.

Primaries close smooth even bluish gray, with basal, apical, and sinus shadings, lines fine, but distinct; M of t.p. line produced, a white band from within reniform, extending obliquely outward, including subreniform, not reaching inner margin. Secondaries rather dull red, median band even, curved, not reaching inner margin. Expands 80—85 mm. Habitat Eastern U.S.

Perplexa is slightly more shaded with blue and lighter.

Var. **petulans**, Hulst. Secondaries yellow, with just a shading of reddish along anal margin.

Larva; Hy. Edw. Papilio, 3, 24. Dull fawn color; a pale brownish dorsal, and a subdorsal line slightly waved; also a brown stigmatal line; head edged with a black line. Food plant Willow and Poplar.

35 **unijuga,** Walk. C.B.M. 1194, Grote, Trans. Am. Ent. Soc. 4, 5, Streck. Rho. Het. 37, pl. 5, f. 9, *junctura*, Grt. (nec. Walk.) Trans. Am. Ent. Soc. 4, 5, Can. Ent. 9, 168, Hy. Edw. Bull. Brookl. Ent. Soc. 3, 56, *Lucilla*, Worth. Papilio 3, 40.

Primaries very light squammose gray, heavily powdered and shaded with black atoms; the base, reniform and terminal space, especially heavily shaded; t.a. line geminate, diffuse; t.p. line rather heavy, M not very strong, the line below dentate; subreniform white; a diffuse white spot beyond reniform; s.t. line white, dentate. Secondaries red, somewhat shaded at base, with black median band strong, reaching anal margin; marginal band broad. Expands 80—85 mm. Habitat, N.E. U.S. and Northward.

I am not able to see any distinct difference in *Lucilla*.

Var. **Meskei,** Grt. Can. Ent. 5, 161, l.c. 5, 233, l.c. 9, 168, Hy. Edw. Bull. Brookl. Ent. Soc. 3, 55.

Primaries somewhat lighter than *unijuga*. Secondaries with median and marginal bands narrower, the former not reaching anal margin.

Var. **beaniana,** Grt. Can. Ent. 10, 195. Noct. N.A. 67, pl. 4, f. 42, Hy. Edw. Bull. Brookl. Ent. Soc. 3, 55.

Primaries darker than *unijuga*. Secondaries with median band more even, not reaching anal margin.

Larva; Kellicott, Can. Ent. 13, 38, Bunker (*Meskei*), l.c. 15, 100. Gray to gray drab; nearly concolorous, without protuberances. Food plant, Poplar and Willow.

36. **pura,** Hulst, Bull. Brookl. Ent. Soc. 2, 96, Papilio, 1, 218, Grote, l.c. 1, 163, Can. Ent. 15, 11, 13.

Primaries white, lightly and diffusely shaded with blackish; lines much as in *unijuga*; submarginal space whitish, evenly and strongly dentate outwardly; a slight longitudinal shading from base, across the wing, parallel with inner margin often present. Secondaries bright red; marginal band not much curved, short. Expands 75—80 mm. Habitat, Col. and New Mexico.

I would have no hesitancy in referring *pura* as a synonym of *semirelicta*, and both as a var. of *Briseis*, were it not that in *pura* the hind tibiæ are spinulated. In coloration they very closely resemble each other. It is my present idea that *pura* is the form *unijuga* takes in Col. and N. Mex., as *Stretchii* may be along the Pacific Coast.

37. **Stretchii,** Behr. Trans. Am. Ent. Soc. 3, 24, Hy. Edw. Cal. Acad. Sci., July 19, 1875.

Primaries like *unijuga*, but without white beyond reniform, and on subreniform; and with shadings of cream brown, especially on median space and beyond t.p. line. Secondaries bright red, bands narrower than in *unijuga*. Expands 80 mm. Habitat, Cal. and Ariz.

Var. **Portia,** Hy. Edw. Bull. Brookl. Ent. Soc. 2, 94. Secondaries with margin broken.

Var. **Augusta,** Hy. Edw. Proc. Cal. Acad. Sci. Oct. 18, 1875. Primaries with less bluish, and lacking cream brown; lines lighter.

Var. **Hippolyta,** Hy. Edw. Proc. Cal. Acad. Sci. July 19, 1875; Streck. Rho. Het. p. 99, *Jessica*, Hy. Edw. Proc. Cal. Acad. Sci. Jan. 15, 1877. Even blue gray; lines indistinct. Secondaries with both bands very narrow, rectangular near anal margin. *Jessica*, has these tendencies not so marked as *Hippolyta.*

38. **Rosalinda,** Hy. Edw. Bull. Brookl. Ent. Soc. 3, 55.

Primaries much like *Faustina* though less definite. Secondaries like *Stretchii.* Expands 70—75 mm. Habitat, Col., Kansas.

39. **Faustina,** Streck. Rho. Het. 21, pl. 3, f. 8. Hy. Edw. Proc. Cal. Acad. Sci. July 1875, *Perdita*, Hy, Edw., Streck. Rho. Het. 100, l.c. 129, Proc. Cal. Acad. Sci. July 1875, *Zillah*, Streck. Rho. Het. 129.

Primaries bluish gray, powdered with brown atoms; lines well defined; reniform distinct, annulate; subreniform white; a white space within reniform. Secondaries bright red; median band moderately wide, angulated at center outwardly. Expands 70—75 mm. Hab. S Cal. and Ariz.

Zillah has more reddish on secondaries.

40. **verecunda,** Hulst. Primaries light cream gray; lines and secondaries practically as in *Faustina.* Expands 70—75 mm. Habitat, Montana.

Taken in numbers by H. K. Morrison.

41. **allusa,** Hulst. Primaries light gray; heavily marked with blackish; basal space very dark; t.a. and t.p. lines very heavy; reniform nearly black; subreniform round, whitish; spots of s.t. line, and s.t. spots suffused together, forming a row of lengthened quadrate spots. Secondaries as *Faustina.* Expands 75 mm. Habitat, Wash. Ter.

42. **Mariana,** Hy. Edw. Proc. Cal. Acad. Sci. July 19, 1875, Streck. Rho. Het. 99.

Primaries dark iron gray with a bluish tinge; lines as *Briseis*; reniform blackish and indistinct; subreniform lighter. Secondaries rose color; bands as in *Faustina.* Expands 70—75 mm. Habitat, Cal.

Var. **Francisca,** Hy. Edw. Bull. Brookl. Ent. Soc. 3, 57. Primaries with a uniform dull greenish tinge.

43. **Briseis,** Edw. (Bris-E-is), Proc. Ent. Soc. Phil. 2, 508, Grote, Trans. Am. Ent. Soc. 4, 5, Streck. Rho. Het. 20, pl. 3, f. 7, *parta*, Walk. C.B.M. 1193.

Primaries gray brown; lines indistinct; M of t.p. line not strongly produced, teeth moderately broad, the lower the smaller; t.p. line evenly scalloped below to sinus, which is not deep; reniform indistinct; subreniform lighter; submarginal space much lighter. Secondaries bright red, with bands as in allied species, save that median band generally reaches anal margin. Expands 75—80 mm. Habitat, Northern and Eastern U.S.

Var. **grotiana,** Bailey, N.A. Ent. 21. Larger than *Briseis*, with subreniform and s.m. space white, and strongly contrasting. Median band of secondaries as in allied species.

Var. **semirelicta,** Grt. 6th An. Rep. Peab. Acad. Sci. 39, Buf. Bull. 2, pl. 1, f. 11, Papilio, 1, 163, Can. Ent. 15, 11, Streck. Rho. Het. 121, Hulst, Papilio 1, 218, Bull. Brookl. Ent. Soc. 3. 11. Very like *pura* in appearance q. v.

44. **Hermia,** Hy. Edw. Bull. Brookl. Ent. Soc. 2, 93.

Primaries brown gray; lines and markings very distinct; t.p. line like *Briseis* save that the sinus is deep, so it nearly reaches t.a. line near inner margin. Secondaries as in allied forms. Expands 80 mm. Habitat, Col.

45. **electilis,** Walk. C.B.M. 1209, Butler. Papilio 1, 171.

Primaries dark cinereous, speckled with black, and with a blackish diffuse band across the middle concealing the reniform spot; lines distinct; submarginal line undulating, incomplete. Secondaries as in allied species. Expands 80 mm. Habitat, Cal. Mex.

Var. **californica,** Edw. Proc. Ent. Soc. Phil. 2, 509, Streck. Rho. Het. 98 pl. 11, f. 13, Hy. Edw. Proc. Cal. Acad. Sci. July 1875.

Primaries much lighter; submarginal white line prominent, distinct, serrate.

Var. **Cleopatra,** Hy. Edw. Proc. Cal. Acad. Sci. July 1875, Streck. Rho. Het. 99. Color of *californica*, but with lines indistinct and s.m. band hardly apparent. Habitat, Cal.

Var. **Irene,** Behr. Trans. Am. Ent. Soc. 3, 24, Hy. Edw. Proc. Cal. Acad. Sci. July 1875, *Virgilia*, Hy. Edw. Bull. Brookl. Ent. Soc. 3, 56. Primaries brown. Habitat, Cal.

Var. **Volumnia,** Hy. Edw. l.c. 3. 56. Primaries much dashed with white; median band reaching anal margin.

Var. **Valeria,** Hy. Edw. l.c. 3, 56. Primaries light fawn color; median band narrow. Habitat, Ariz.

It has been difficult for me to arrive at a decision with regard to a number of species given above. *Faustina* will I am confident be found to intergrade with *verecunda*; likewise *Briseis* with *Mariana*; indeed of *Briseis* I have a specimen from New York, which is the counterpart of *Mariana*. In fact from *verecunda* through *Faustina*, *allusa*, *Mariana*, *Briseis*, *Cleopatra*, *Hermia*, and *californica* to *Irene*, I am confident from the various collections about New York a complete and unbroken series of intergrading specimens could be made. The above however gives my present opinion in view of what I think can be relied upon.

46. **Luciana,** Hy. Edw. Proc. Cal. Acad. Sci. July 1875, Streck. Rho. Het. p. 99, *Nebraskæ*, Dodge, Can. Ent. 7, 2, Grote. l.c. 7, 2, Hy. Edw. Bull. Brookl. Ent. Soc. 3, 54.

Primaries brownish gray, with yellowish tinge; all the lines and spots heavy and strongly marked, shading into black on the margin; reniform large, blackish, surrounded with a paler ring; subreniform open, fawn drab. Secondaries yellowish red; median band narrow, widest at center, not reaching anal margin. Expands 75—80 mm. Habitat, Nebraska, Kansas, Col.

Var. **Somnus,** Dodge, Can. Ent. 13, 40. Primaries head and thorax black, thinly powdered with gray scales; abdomen and long scales at base of hind wings black.

47. **concumbens,** Walk. C.B.M. 1198, Grote, Trans. Am. Ent. Soc. 4, 7, Streck. Rho. Het. 39, pl. 5, f. 12, *Diana*, Hy. Edw. Bull. Brookl. Ent. Soc. 3, 57.

Primaries pale violaceous brown, mixed with gray, lightest towards costa, lines fine, but distinct; reniform vague, whitish, pale brown within. Secondaries bright pink; median band very broad, rapidly narrowing towards anal margin, which it does not reach; the submarginal pink space even, through its whole length. Expands 75 to 85 mm. Habitat, N. and N.E. U.S. and Northward.

Diana has the abdomen partly pink.

Aber. **Hullii,** Grt. Papilio, 3, 43. Secondaries yellow in place of pink.

Larva; Saun. Proc. Ent. Soc. Phil. 2, 29. Head dark gray intermixed with red; upper surface dirty brown, with light dorsal stripe; a small protuberance on 8th segment, and lunule on 10th. Food plant, Willow and Poplar.

48. **cara,** Guen, Noct. 3, 87, Walk. C.B.M. 1196, Grote, Trans. Am. Ent. Soc. 4, 7, Streck. Rho. Het. 98, pl. 11, f. 14.

Primaries deep blackish brown; lines narrow, distinct anteriorly; lines and veins shaded with olivaceous. Secondaries intense rose red, with a broad even black median band reaching anal margin. Expands 85—95 mm. Habitat, Middle and Eastern States and Northward.

Var. **carissima,** Hulst, Bull. Brookl. Ent. Soc. 2, 97, *Sylvia*, Hy. Edw. l.c. 3,57. Primaries rich velvety brown, spotted and flecked with olivaceous scales, which form a large spot at apex. Expands 90—100 mm. Habitat, S. and E. from *cara*. *Sylvia* is slightly more spotted with olivaceous.

Larva; French, Papilio 2, 157, Koebele, (*carissima*) Bull. Brookl. Ent. Soc. 4, 22.—2.5 inches in length. Color after 1st moult, whitish green; after 2nd, almost black; after 3rd, striped with two shades of brown, this color remaining through the rest of the history; the lighter color prevails dorsally the darker laterally; two subdorsal black lines, and one stigmatal; a protuberance on 8th segment, pale orange, spotted with black; head brown, mottled with blackish carneous; it moults 5 times. Food plant, Willow and Poplar.

49. **amatrix,** Hub. *Lamprosia amatrix*, Noct. f. 487, Saml. 2, f. 3, 4, Verz. 2722, *Cat. amatrix*, Guen. Noct. 3, 86, Grote, Trans. Am. Ent. Soc. 4, 7, Streck. Rho. Het. 98, pl. 11, f. 15, *selecta*, Walk. C.B.M. 1197, *nurus*, Walk. C.B.M. 1195, Streck. f. 16. *Editha*, Edw.

Primaries even light brown, nearly unicolorous; lines fine distinct; M of t.p. line strongly produced, teeth about equal; reniform darker, doubly annulate; subreniform lighter. Secondaries rosy red; median band generally much like *cara*, but not reach–

ing anal margin; when narrow, it is incised within at the middle of wing. Expands 95—105 mm. Habitat, East of the Miss., Texas and Ariz.

Nurus differs in having the longitudinal shading.

Larva; Kellicott, Papilio 1, 142, French, l.c. 4, 8. Ground color very pale lilac white, with 3 dorsal and 3 lateral stripes; slight protuberance on 8th segment, clay colored; a pair of slight protuberances on 11th segment. Food Willow and Poplar, moults 5 times.

50. **junctura,** Walk. C.B.M. Grt. Can. Ent. 14, 47, l.c. 15, 12, *Walshii.* Edw. Proc. Ent. Soc. Phil. 2, 509, Grt..Can. Ent. 5, 233, l,c. 15, 12, Papilio 1, 163, Hulst, l.c. 1, 218, Hy. Edw. Bull. Brookl. Ent. Soc. 3, 55.

Primaries dark cinereous very slightly and partly clouded with black; lines indistinct, slightly and diffusely bordered with brown, as is also the subreniform; s.t. line dentate quite distinct. Secondaries red lead color; median band rather narrow, nearly straight, angulated near end, not reaching anal margin. Expands 100—110 mm. Habitat, Texas.

Var. **Arizonæ,** Grt. Can. Ent. 5, 163, l.c. 5, 233. Primaries a little darker, with less brown; lines a little more distinct.

Very close to *junctura*, but the form seems to be permanent in Colorado, and incidental through Utah and Southward. (See note below on *babayaga.*)

Var. **Aspasia,** Streck. Rho. Het. p. 94. Primaries largely light creamy brown, less unicolorous than *junctura*. S.W. Texas.

Var. **Cassandra,** Hy. Edw. Proc. Cal. Acad. Sci. July 1875, Bull. Brookl. Ent. Soc. 3, 56, *Sara,* French, Can. Ent. 15, 163.

Primaries much darker, almost black on basal space, along inner and outer margin.

51. **babayaga,** Streck. Papilio 4, 73, *Arizonæ,* Grt. Can. Ent. 13, 232, l.c. 15, 12.

Primaries rich velvety reddish brown; otherwise as *junctura*. Expands 100 mm. Habitat, Ariz. Food plant, Willow (Auct. Doll.).

Mr. Grote has long claimed this insect to be his *Arizonæ*; but his type of *Arizonæ* is in the posession of the Ent. Soc. of Phila. and is not this species. Nor does his description tally with this, but with the type. We can not take his recollection against this evidence.

52. **relicta,** Walk. C.B.M. 1193, *Cat. fraxini,* Guen. Noct. 3, 83, Grote, Trans. Am. Ent. Soc. 4, 4, Can. Ent. 7, 186, l.c. 8. 231, Streck. Rho. Het. 19, pl. 3, f. 5, 6, *Bianca,* Hy. Edw. Bull. Brookl. Ent. Soc. 3, 54, *Phrynia,* Hy. Edw. l.c. 3, 54.

Primaries white, powdered and shaded more or less with black; easily known by the even white median band on the otherwise black secondaries. Expands 80—85 mm. Habitat, Middle and Eastern States and Northward. Food plant, White Birch and Silver Poplar; and probably all species of Betula and Populus.

Phrynia, differs from the lighter type form by having the fore wings pretty evenly powdered with black, and *Bianca* by having the basal space, and the t. p. region quite dark.

53. **tristis,** Edw. Proc. Ent. Soc. Phila. 2, 511, Grote, Trans. Am. Ent. Soc. 4, 4, Streck. Rho. Het. 17, pl. 3, f. 1.

Primaries light gray, blackish along inner margin, lines indistinct; t.p. line without prominent teeth; reniform blackish; subterminal line white, serrated. Secondaries black; fringe white at apex. Expands 40 - 50 mm. Habitat, Eastern, Middle and Western States, and Northward.

54. **Epione,** Dru. (Ep-I-o-ne), *Noctua Epione*, Ins. 1, 47, pl. 23. f. 2, Cram. Pap. Ex. 2, pl. 102, f. E, F, Fab. Sys. Ent. 3, 2. 163, Oliv. Ency. Meth. 8, 288, 190, *Mormonia Epione*, Hub. Verz. 276, 2712, *Cat. Epione*, Guen. Noct. 3, 93, Walk. C.B.M. 1200, Grote, Trans. Am. Ent. Soc. 4, 2.

Primaries very dark gray; lines heavy; t.p. line not strongly angulated, and almost without sinus; reniform reddish; a reddish band beyond t.p. line then, lighter often almost white, serrated outwardly. Secondaries black; fringes pure white.

Larva; Guen. Noct. 3, 93. Body reddish gray, marbled with bluish gray; a subdorsal black line interrupted at the middle of each segment; a paler lateral band; no protuberances; head gray with two red points. Feeds on Oak.

§§§ CATABAPTA, Hulst.

55. **antinympha,** Hub. *Ephesia antinympha*, Verz. 278, 2731, *Phalæna paranympha*. Dru. Ins. 1, 49, pl. 23. f. 6, *Cat. affinis*, West. Dru. 1, 44, pl. 23, f. 6, *melanympha*, Guen. Noct. 3, 98, *antinympha*, Walk. C.B.M. 1203, Grote, Trans. Am. Ent. Soc. 4, 13, Streck. Rho. Het. 36, pl. 5, f. 7.

Primaries dead black, with velvety black lines; often a lighter spot before reniform and subreniform. Secondaries bright yellow; median band even, moderately broad. Expands 50—60 mm. Habitat, Eastern, Middle, and Western States.

56. **serena,** Edw. Proc. Ent. Soc. Phila. 2, 510, Grote, Trans. Am. Ent. Soc. 4, 13, Streck. Rho. Het. 23, pl. 3, f. 11.

Primaries close even uniform smoky gray; lines fine but distinct; t.p. line with but one prominent tooth; reniform brownish; subreniform round, a little lighter. Secondaries light yellow; median band narrow, angulated; yellow interspace, often very narrow. Expands 60 65 mm. Habitat, Northern and Eastern U.S. It also occurs in Eastern Siberia. Food plant, Hickory, (Auct. Angus).

57. **badia,** G. & R, Proc. Ent. Soc. Phila. 6, pl. 4, f. 1, Trans. Am. Ent. Soc. 4, 12, Andrews, Can. Ent. 8, 198.

Primaries pale chestnut brown, with two transverse dark brown shades obscuring the ordinary lines; the first within the t.a. line, the second over and without the t.p. line. Secondaries. light bright yellow, quite even, middling broad. Expands 60 to 70 mm. Habitat, Eastern, and Middle States to Mass. Food plant, Wax Myrtle, (Myrica).

Var. **cœlebs,** Grt Trans. Am. Ent. Soc. Sept. 1874, Can. Ent. 10, 233, l.c. 15, 23, Hulst, Bull. Brookl. Ent. Soc. 3, 9.

Primaries with brown all lost, being replaced with black and gray, and these broken up; lines very distinct; appearance decidedly like *consors*. Secondaries like *badia*. Found in Maine and N. New York.

Var. **Phœbe,** Hy. Edw. MSS. A form intermediate between *cœlebs* and *badia*, in which the brown holds, but is broken into bands and edgings, and the lines are distinct. Found in Mass. and N. Hampshire.

58. **muliercula,** Guen. Noct. 3, 97, Walk. C.B.M. 1203, Grote, Trans. Am. Ent. Soc. 4, 12, Streck. Rho. Het. 74, pl. 9, f. 9.

Primaries deep rich brown shaded with bluish over the median space; lines distinct; t.a. line rather heavy near costa; t.p. line with M prominent; s.t. white space evident: subreniform light. Secondaries deep yellow; median band moderately broad, often quite constricted near middle; marginal band broad, with two scallops inwardly. Expands 60--70 mm. Habitat, Eastern, Middle, and Western States.

Var. **peramans,** Hulst. Primaries darker. Secondaries almost entirely black, the yellow interspace showing only brokenly.

Larva; Guen. Noct. 3, 97. The larva is very much attennated, quite narrow at the extremities and swollen in the middle. It is reddish yellow in color with gray subdorsal and stigmatal lines; the head is concolorous with the body with two white dashes laterally. Feeds on Wax Myrtle (Myrica).

59. **habilis,** Grt. Trans. Am. Ent. Soc. 4, 11, *basilis*, Grt. Can. Ent. 8, 230.

Primaries quite unicolorous pale gray with a greenish tint; lines black, narrow, often indistinct; M of t.p. moderately strong, the upper tooth the more prominent; submarginal space whitish, serrated. Secondaries dull, dark yellow; median band rather slight, constricted, narrowing towards anal margin and often reaching it. Expands 60 – 70 mm. Habitat, Eastern, Middle, and Western States. Food plant, Hickory, (Auct. Angus).

Basilis differs only in the presence of the basal dash.

60. **innubens,** Guen. Noct. 3, 98. Walk. C.B.M. 1203. Grote, Trans. Am. Ent. Soc. 4, 8. *Hinda*. French, Papilio 1, 111.

Primaries rich brown, powdered with glaucous scales; lines distinct, black; M of t.p. line strong, teeth broad, even; reniform brown, annulate with pale white; subreniform pale, often nearly white, small; at the apex resting on costa is a large triangular whitish spot. Secondaries reddish orange; median band rather broad, quite even. Expands 65 – 70 mm. Habitat, Eastern, Middle, and Western States. Food plant Walnut.

Hinda has broad, darker brown shading from base to apex.

Var. **flavidalis,** Grt. Papilio 1, 63. Secondaries yellow.

Var. **scintillans,** G. & R. Proc. Ent. Soc. Phila. 6, 28, pl. 4, f. 6, Trans. Am. Ent. Soc. 4, 8.

Primaries very dark, nearly black, uniform to t.p. line.

61. **paleogama,** Guen. (pal-le-OG-a-ma), Noct. 3, 97, Walk. C.B.M. 1202, Grote, Trans. Am. Ent. Soc. 4, 10, Proc. Ent. Soc. Phila. 3, pp. 87, 541, pl. 3, f. 2, *Annida*, Fager, Can. Ent. 14, 120.

Primaries gray, powdered with greenish gray and black scales, and shaded with blackish, and with bright brown in s.t. space; lines rather broad, distinct; reniform rounded, brown or black, indistinct; subreniform pale, small; sinus of t.p. line broadly marked, acute, not deep; teeth of M strong. Secondaries dark yellow; median band narrow, much constricted, reaching internal margin. Expands 70—75 mm. Habitat, Eastern, Middle, and Western States. Food plant, Walnut.

The larva I have taken with those of *neogama*, but it was not enough different to arrest my attention. *Annida* differs in having the posterior half of the primaries darker.

Var. **phalanga,** Grt. Proc. Ent. Soc. Phila. 3, 86, pl. 3, f. 1, Trans. Am. Ent. Soc. 4, 11. Primaries with basal space black, a black band beyond t p. line, the rest light gray.

62. **neogama,** Abb. & Sm. (ne-OG-a-ma), *Phalæna neogama*, Lep. Ga. 2, 175, pl. 88, Oliv. Ency. Meth. 8, 290, 195, West. Nat. Lib. 37, Ex. Moths, 202, pl. 26, f. 1, 2, *communis*, Grt. Trans. Am. Ent. Soc. 4. 9, *neogama*, Guen. Noct. 3, 96, Walk. C.B.M. 1202, Streck. Rho. Het. 35, pl. 5, f. 4, 5, Grt. Papilio, 1, 163, l.c. 2, 8.

Primaries light gray, marked within t.a. line, at reniform, and beyond t.p. line, with light brown; all lines evident, but not always distinct; M of t.p. line produced, sinus large; basal and subapical dashes generally present. Secondaries yellow, median band constricted and angulated. Expands 75—90 mm. Habitat, East of Rocky Mounts and Ariz. *Communis* has the hind wings a little darker yellow than the type form.

Var, **snowiana,** Grt. Pap. 1, 163, l.c. 2, 8. Described from an aberrant and somewhat aborted specimen from Kansas, with primaries much more heavily marked with black. It is with great hesitancy I write this a variety.

The specimens from Ariz. have the marginal border of the hind wings broken.

Larva; Guen. Noct. 3, 96. Color brownish gray, formed by many longitudinal striæ on light ground; piliferous points separate as is usual. Feeds on Walnut.

63. **subnata,** Grt. Proc. Ent. Soc. Phil. 3, 326, Trans. Am. Ent. Soc. 4, 9, Streck. Rho. Het. 34, pl. 5, f. 3.

An insect very much like *neogama*, but generally larger, with lines and markings more diffuse, and the teeth of the M of t.p. line very strongly produced. Expands 95 to 105 mm. I have seen a specimen, which would not measure more than 70 mm. Habitat, Eastern and Middle U.S. Food plant, Walnut, (Auct. Angus).

I am in much doubt as whether this is a distinct species. Mr. Grote gives 5 points of difference; the more slender body parts, the greater expanse, the large open subreniform, the paler hind wings, and the more acutely dentate t.p. line. But all these vary through both species. I see nothing but a more general diffuseness, a very unsatisfactory specific distinction.

64. **piatrix,** Grt. Proc. Ent. Soc. Phila. 388, 532, pl. 3, f. 3, Trans. Am. Ent. Soc. 4, 10, Streck. Rho. Het. 74, pl. 9, f. 8.

Primaries dark wood brown, or blackish brown, slightly silky, darker shaded in the subbasal space, on the costa, above discal cell, and subapically; t.a. line geminate, outer line sometimes less distinct; reniform shaded with black; subreniform pale; t.p. line with M prominent, and sinus heavy; s.t. line geminate, with grayish between. Secondaries deep yellow, internal margin and base dusky; median band not much constricted. Expands 85—95 mm. Habitat, East of Plains. Food plant, Walnut, Hickory and Persimmon, (Auct. Koebele).

Var. **Dionyza,** Hy. Edw. MSS. A form from Arizona with lighter primaries, and with secondaries bright yellow.

65. **nebulosa,** Edw. Proc. Ent. Soc. Phila. 2, 510, Streck. Rho. Het. 75, pl. 9, f. 11, Grote, Trans. Am. Ent. Soc. 4, 11, *ponderosa*, G. & R. Proc. Ent. Soc. Phil. 6, 23, pl. 4, f. 2.

Primaries gray cream color, variable in depth of tint, much shaded with deep brown; basal space dark brown or black, except along inner margin; reniform doubly annulate, not distinct; subreniform small; t.p. line distinct, M prominent. the lower tooth shorter; outer third browner with violet shade. Secondaries dark yellow, median band not much constricted; marginal band broad; margin yellow. Expands 90 –100 mm. Habitat, Middle and Western States.

66. **Judith,** Streck. Rho. Het. 95, pl. 11, f. 5. Hulst, Bull. Brookl. Ent. Soc. 3, 8, Papilio 1, 215, *Levettei*, Grt. Trans. Am. Ent. Soc. Sept. 1874, Papilio 1, 160.

Primaries close even light gray, with a dusky shade; lines fine, faint, sometimes party obsolete; no basal or apical dashes; reniform brownish, annulate with whitish; M of t.p. line with upper tooth broad, much the larger; a s.t. lighter band. toothed strongly at M of t.p. line. Secondaries black, fringes dark. Expands 40—50 mm. Habitat, Eastern and Middle States. Food plant, probably Hickory, (Auct. Angus.)

Var. **Miranda,** Hy. Edw. Papilio 1, 111. Differs in being smaller, and with fringe of secondaries whitish on outer margin to apex.

67. **Robinsonii,** Grt. Trans. Am. Ent. Soc. 4, 20, Streck. Rho. Het. 71, pl. 9, f. 1, *curvata*, French, Papilio 1, 218.

Primaries even, smooth, pale greenish cinereous, generally without shades; lines fine, distinct; M of t.p. line middling strong; a black shading on costa at reniform; reniform lighter; a s.t. white space beyond t.p. line. Secondaries black; fringe white. Expands 75—80 mm. Habitat, Middle and Western States. Food plant, Hickory, (Auct. Angus). *Curvata* is the name given to the form with basal and apical dashes.

68. **dejecta,** Streck. Bull. Brookl. Ent. Soc. 2, 97.

Primaries narrower and more pointed than usual, light gray, heavily shaded with bluish, without dashes; a pale spot before reniform, which is dark; subreniform lighter; M of t.p. line strong, teeth subequal. Secondaries black; fringe white blackish at ends of veins. Expands 70—75 mm. Habitat, Eastern, Middle, and Western States.

69. **retecta,** Grt. Trans. Am. Ent. Soc. 4, 4. Streck., Rho. Het. 71, pl. 9, f. 2, *flebilis*, Grt. Trans. Am. Ent. Soc. 4, 4, Can. Ent. 8, 229, Streck. Rho. Het. 71, pl. 9, f. 3, 4.

Primaries pearlly cinereous, dash at base, and at sinus of t.p. line; lines distinct; M of t.p. line strongly produced, teeth nearly equal. Secondaries black; fringe white. Expands 70—75 mm. Habitat, Middle and Western States. Food plant, Hickory (Auct. Angus).

Flebilis has a diffuse black shading reaching from base, longitudinally across wing to apex.

70. **luctuosa** Hulst. Primaries like *retecta* in markings, but with apical shading; wings broader and outwardly more rounded, and more or less generally covered with a brownish shading, often with a violet tinge. Secondaries black, with fringes broader and dull white, and marked with black at end of veins. Expands 75—80 mm. Habitat, Middle, and Western States. Food plant, probably Hickory.

This species I find in collections generally labelled *retecta*. Mr. Grote in his description speaks nothing of the reddish, and Mr. Strecker's figure does not show it. The typical specimens in Phila. cover both species. I describe and name the form, Mr. Grote did not.

71. **vidua,** Abb. & Sm. *Phalæna vidua*. Lep. Ga. 181, pl. 92, Grote, Trans. Am. Ent. Soc. 4, 3, Check List N.A. Moths, p. 65, *desperata*, Guen. Noct. 3, 95, Walk. C.B.M. 1200, Grote. Trans. Am. Ent. Soc. 4, 3, Streck. Rho. Het. 33, pl. 5, f. 2, Hulst, Bull. Brookl. Ent. Soc. 3, 12.

Primaries with the color of *retecta* and markings of *luctuosa*, through these are here heavier and more decided; t.a. line heavily geminate, connecting half way with heavy black basal dash; apical and sinus shading heavy; t.p. line with M very much produced. Secondaries black, slightly gray at base; deep white fringe; in some specimens there is near anterior margin a faint indication of a white median band. Expands 80--90 mm. Habitat, Middle, Western, and Southern States.

Larva; greenish gray, with many black lines; whiter laterally; slight protuberances on each segment; head gray, edged behind with black. Feeds on Oaks, (Abb.), Hickory, (Angus), and Walnut, (Koebele).

72. **mæstosa,** Hulst, *vidua*, Guen. (nec. Abb. & Sm.) Noct. 3, 94, *viduata*, Guen. Noct. 3, 400, Grote, Trans. At. Am. Ent. Soc. 4, 3, Check List, N.A. Moths, p. 65, Streck. Rho. Het. 17, pl. 3, f. 2, Hulst, Bull. Brookl. Ent. Soc. 3, 12.

Primaries very nearly the color of *vidua*; lines diffuse, not strongly distinct; t.p. line with M strong; sinus comparatively small; no basal dash; reniform reddish; reddish band beyond t.p. line; t.a. clouded with black at costa, and a heavy diffuse black shade from costa above reniform, through M of t.p. line to below apex. Secondaries black, dull gray at base; fringe white, ends of veins black. Expands 95—105 mm. Habitat, Southern States. Food plant, Walnut.

I have made the disposition of this species I have, as I see no other way out of the difficulty. It seems universally agreed that *desperata*, Guen., is *vidua*, Abb. and Sm. There is no course to follow, but that which is always taken, to call it by the name under which it was first described, and under which it, its larva, and food plant were as well figured. The name *desperata* can not properly stand. *Mœstosa* is the insect called *viduata* by Guen.. which was only a putting in another form the name *vidua* of Abbott, whose species Guenee thought this was. *Vidua* and *viduata* are practically the same names; were meant to be the same. The only solution, and the one which has been universally followed in the science, is to give the mistaken species a name, which I have here done.

73. **lacrymosa,** Guen. Noct. 3, 93, Walk, C.B.M. 1199, *lachrymosa*, Grote, Trans. Am. Ent. Soc. 4, 19, Streck. Rho. Het. 18, pl. 3, f. 3, *Ululume*, Streck. l.c. 133.

Primaries light cinereous, heavily and quite uniformly powdered with black atoms; slight basal dash present; lines fairly strong, but often lost in the black powdering; t.a. line often confused and broken; t.a. line with teeth medium; reniform brownish; a brownish band beyond t.p. line. Secondaries black, fringe white, black at end of veins. Expands 75—85 mm. Habitat, lower Middle and Western States and Southward. Food plant; probably Oak and Walnut.

Ululume differs in being less strongly powdered with black, and in having with the lines more distinct.

Var. **Evalina,** French, Papilio, 1, 110. *Emilia*, Hy. Edw., l.c, 1, 117. A form having the basal, outer third, and inner half of the primaries nearly or quite black.

Var. **Zelica,** French, Papilio 1, 110. Primaries with t.a. line inwardly, and t.a. line outwardly, having a black band across the wing.

Var. **Paulina,** Hy. Edw., Bull. Brookl. Ent. Soc. 3, 54. Primaries black to t.p. line.

74. **Sappho,** Streck. Rho. Het. 95, pl. 11, f. 4, French, Papilio 1, 57.

Primaries pure white, somewhat clouded with black and light brown; lines indistinct; reniform reddish; black on costa at beginning of t.a. line, and above reniform. Secondaries black, fringes white or dark. Expands 75—80 mm. Habitat, Western States and Southward.

75. **Agrippina,** Streck. Rho. Het. 95, pl. 11, f. 1, 2.

Primaries uniform blackish gray, powdered with dusky reddish brown; lines black, heaviest on costa; reniform indistinct, brown; brown band beyond t.p. line. Secondaries black; fringes dull white. Expands 75—85 mm. Habitat, Middle and Southern States.

Var. **subviridis,** Harv. Can. Ent. 9, 193, Streck. Rho. Het. 95, pl. 11. f. 3. Primaries shaded with light silky green; much lighter along inner margin.

Agrippina is subject to very great variation in the color of primaries.

76. **insolabilis,** Guen. Noct. 3, 94, Walk. C.B.M. 1200, Grote, Trans. Am. Ent. Soc. 4, 3, Buf. Bull. 187, pl. 5, f. 3, Streck. Rho. Het. 33, pl. 5. f. 1, **Hulst,** Bull. Brookl. Ent. Soc. 3, 13, Angus, Papilio, 4, 35.

Primaries light blue gray, heavily powdered with black; clouded with black along inner margin; generally on median space, just anterior to this black margin, a triangular pale or white space; basal dash always turned downward outwardly. Secondaries black, fringes dark. Expands 75—85 mm, Habitat, Middle, Western, and Southern States. Food plant, Hickory.

77. **Angusi,** Grt. Can. Ent. 8, 229, Buf. Bull. 187, pl. 5, f. 1, 2, Hulst, Bull. Brookl. Ent. Soc. 3, 13, Angus, Papilio, 4, 35, *Lucetta,* Hy. Edw. French, Cat. Ills. p. 4.

Primaries dark greenish gray; no band on inner margin though often a cloud at sinus of t.p. line and below apex; no triangular white spot on median space; basal dash turning upward outwardly; in these things differing from *insolabilis*. Secondaries black. fringe dark, rarely light. Expands 70—80 mm. Habitat, same as *insolabilis.* Food plant, Hickory (Auct. Angus).

Lucetta differs in having a longitudinal shading from base to beneath apex.

This insect though generally smaller and easily distinguished, often wonderfully resembles *insolabilis.* Indeed the direction of the basal dash is the only feature in one, which I have not seen as well as in the other.

78. **obscura,** Streck. Rho. Het. 19, pl. 3, f. 4, *simulatilis,* Grt. Trans. Am. Ent. Soc. Sept. 1874, Can. Ent. 8, 229, Papilio 2, 8.

Primaries uniform dull smoky gray; lines fine, but distinct; M of t.p. line with upper tooth much the larger; submarginal space whitish, serrated. Secondaries black, fringes white. Expands 70 - 80 mm. Habitat, Middle, Western and probably Southern States. Food plant, Hickory (Auct. Angus).

Var. **residua,** Grt. Proc. Bost. Soc. Nat. Hist. 16, 242, Buf. Bull. 187, pl. 5, f. 4, Hulst, Bull. Brookl. Ent. Soc. 3, 13, Angus, Papilio 4, 35. Primaries a brighter, bluer color. Secondaries with fringes often dark.

Some notes upon the Catocalæ are to be found as follows; they include lists of captures and general observations. Grote, Can. Ent. 4, 16, l.c. 5, 161, l.c. 15, 11, l.c. 9, 168, Bunker, l.c. 6, 25, Bailey, l.c. 9, 216, Harvey, l.c. 9, 192, Murray, l.c. 9. 18, Dury, l.c. 8, 187, Grote, l.c. 8, 229, French, l.c. 12, 241, Johnson, l.c. 12, 137, l.c. 14, 59, Hulst, Bull. Brookl. Ent. Soc. 3, 1—20, Grote, Papilio 1, 159—164, Hulst, l.c. 1, 215, Grote, l.c. 2, 8, Fernald, l.c 3, 23, French, Synopsis Cat. Ills. 1882.

ADDENDA AND ERRATA.

Page 13, line 7 from bottom, *Belfragiana* should be *Messalina*.

Page 16, line 20, for "in all cases" substitute the words "very often".

Page 20, line 28, for "adaption" read "adaptation".

Page 25, line 8, for "*elonympha*" read "*Allotria*".

Page 33, line 4, for "1883" read "1882".

Page 35, line 8, for "Trans. Am. Ent. Soc." read Proc. Ent. Soc. Phila." The same correction should be made on the same page lines 17 and 23.

Page 38, line 4, after 103 "(?)" should be inserted.

Page 38, line 15, after "writes me" insert "his opinion is". I do not understand that he has ultimate evidence. At any rate the description being based on a picture, can not stand.

Page 51, last line omit "as".

The following words, printed with capital letters beginning, should have been begun with lower case letters: page 24, line 28, *Nubilis*; page 26, line 24, *Verrilliana*; page 34, line 27, **Amica**; page 29, line 28, **Amasia**; p. 13, line 7 from bottom, and page 34, line 1, *Belfragiana*; page 34, lines 27 and 28, *Amica*, *Andropphila*, and *Lineella*; page 35, line 4 from bottom, **Grynea**.

The following words beginning with lower case letters should begin with capitals: page 13, last 3 lines, *ilia*; page 29, line 9 from bottom, and page 38, lines 23, 33, 36, 39, 41, and page 39, line 1, *cratægi*.

SYNOPSES OF COLEOPTERA.

PRIONUS, *Geoff.*

This genus and *Homaesthesis* constitute the group *Prionini*, all the species of which resemble one another closely in superficial appearance. The body is relatively broader than in any of the other genera and gives the insects a stout or heavy aspect.

The mandibles are moderate in size, acute and similar in the sexes. The eyes are large and coarsely granulated. The antennæ are heavily imbricate in the males, more slender and serrate in the females. The thorax as noted above is tridentate in *Prionus*, unidentate in *Homæsthesis*. The elytra are broadly rounded at apex, coriaceous, punctate, and ornamented with raised lines. The legs are slender, compressed and punctate. The species in color are a uniform brown or black.

SYNOPTIC TABLE OF PRIONUS.

Sensitive surface antennæ ♂ and ♀ reticulate with fine elevated lines.
Antennal joints 12; soles hind tarsi densely pubescent.
Elytra at base not wider than thorax.............................. **laticollis.**
Elytra at base wider than thorax.
First two thoracic teeth prominent not reflexed.................. **pocularis.**
First two thoracic teeth very acute and reflexed................ **californicus.**
Antennal joints more than 12; soles hind tarsi with scattered hairs.
Antennal joints ♀ 18, ♂ 18–20.................................. **imbricornis.**
Antennal joints ♀ 25, ♂ 27–30.................................. **fissicornis.**
Sensitive surface ♂ uniform.
Antennal joints 12; soles of hind tarsi concave and sparsely pubescent. . **palparis.**

SYNOPTIC TABLE OF HOMAESTHESIS.

Sensitive surface ♂ uniform; soles of hind tarsi concave and sparsely pubescent; antennæ 13–14 jointed.
Thorax strongly punctured, pubescent, lateral tooth very obtuse,.... **emarginatus.**
Thorax slightly punctured, not pubescent, lateral tooth acute.............. **integer.**

The tables are exhibited in the above form for the purpose of showing clearly the close relation between the genera, and also the intermediate position which *palparis* occupies.

P. laticollis, Drury, Ill. II, 1773, p. 83, t. 37, f. 2; Harris, Ins. Mass. p. 79, *brevicornis*, Fab. Syst, El. II, p. 260; Beauv. Ins. Afr. et Am. p. 216; Lec. Journ. Ac. Phil. ser. 2, II, p. 109.

The thorax is distinctly wider in this than in any other species, so that it is almost if not quite as wide as the elytra at base. All the joints of the hind tarsi are densely pubescent or spongy beneath, with a smooth median channel. The lateral teeth of prothorax are well developed, sometimes even slightly reflexed as in *californicus.* The color is brownish varying to black. It is generally darker than in the other species. Length, ⅞ to 1⅞ inches = 22–47 mm. Habitat, Northern, Middle and Atlantic States.

P. pocularis, Dalm. Schoenh. Syn. Ins. I, 3, 1817. p. 148; *curticornis,* Lec. J. A. P. ser. 2, II, p. 109; *obliquicornis,* Lec. J. A. P. ser. II, p. 108; *laevigatus,* Harris, Trans. Soc. Htford 1836, p. 83, t. 1, f. 6; Lec. J. A, P. ser. 2, II, p. 109; *denticornis,* Sturm, Cat. 1836, p. 187.

The thorax is narrower than the elytra at base, the lateral teeth prominent but never reflexed. The first joint of hind tarsi is almost entirely glabrous, the second and third spongy with a median smooth channel. Color as in *laticollis* but not so dark, antennæ more slender. Length, 1 to 1.75 inches = 25—45 mm. Habitat, Middle and Southern States.

P. californicus, Motsch. Bull. Mosc. 1845, I, p. 89, t. 2, f. 9; Mannh. Bull. Mosc. 1852, II, p. 364; *crassicornis,* Lec. J. A. P. ser. 2, II, 1852, p. 108

The species is distinguished by the very acute and strongly reflexed lateral teeth of prothorax. The soies of the hind tarsi are as in *laticollis.* Color as in preceeding. Length 1¾ to 2⅛ inches = 45—52 mm. Hab. California.

Curvatus is a variety of the last in which the lateral teeth are more reflexed than in the typical form.

The above species are very closely related. The characters given will serve to separate them although specimens will be found which will seem intermediate in form. It is a remarkably interesting fact that the specific differences intergrading as they do are such as are used to separate the genera in many families.

P. imbricornis, Linn. Syst. Nat. Ed. XII, p. 622; Beauv. Ins. Afr. et Am. p. 242, t. 36, f. 2, ♀ Lec. J. A. P. ser. 2, II, p. 108.

The thoracic teeth are much less prominent in this species, showing a gradation to *Homæsthesis.* The number of the antennal joints varies somewhat, in the specimens under examination within the limits given in the table. Each joint in ♂ is conical hollowed to receive succeeding joint and with the lower edge prolonged; in ♀ much more slender and simply serrate. Elytra ♀ are more convex than ♂. The covering of hair on soles of hind tarsi is very thin and the smooth channel very narrow. Length ⅞ to 1⅞ inches = 22—47 mm. Habitat, Southern and Western States.

P. fissicornis, Hald. Proc. Ac, Phil. III, p. 125, Lec. J. A. P. ser. 2. II, p. 108, Col. Kan. t. 1, f. 14.

Thoracic teeth as in *imbricornis*. Antennal joints as in table. Each joint V-shaped, the posterior branch the longer with its apex curved. Joints in ♀ serrate. The joints of the hind tarsi are more slender than in the other species, and the pubescence is as in *imbricornis*. The species is easily known by the number and shape of the antennal joints. Length 1 to 1.6 inches =25—40 mm. Hab. Nebraska, Texas.

P. palparis, Say, J. A. P. III, p. 327; Lec. J. A. P. ser. 2, II, p. 109.

This species present a curiously intermediate form. The form of the thorax is more convex and the lateral teeth less marked, showing a strong tendency to the form of *Homæsthesis* while the poriferous sensitive spaces of antennæ and the soles of the hind tarsi (which are scarcely pubescent and not at all spongy) are precisely the same as in that genus. The first joint of hind tarsi is shorter than in the other species and the posterior tibiæ are much more bent. Length, 1.1 to 1.5 inches = 24 to 37 mm. Hab. Nebraska.

H. emarginatus, Say, J. A. P. III, 1823, p. 327; Lec. J. A. P. ser. 2, II, p. 107; Col. Kan. t. 2, f. 13. ♀. *innocuus*, Lec. Proc. Ac. Phil. 1862, p. 43, (*Prionus*.)

This species is easily known by the characters given in table. Length .75 inches = 18 mm. Hab. Western States.

H. integer, Lec. J, A. P. ser. 2, II, p. 107.

The acute lateral tooth of thorax, and the lack of pubescence will serve to at once distinguish this species. Length 1 inch = 25 mm. Hab. Col. and West. States.

TRACOSOMA, *Serv.*

This genus constitutes the tribe *Tragosomini*. The body is elongate, brownish. Head and mandibles small and inconspicuous. Thorax convex, armed with a small single acute tooth on each side, pubescent with long, brownish hair. Elytra also brownish, punctured and finely ribbed, rounded at tip, suture armed with small acute spine; the elytra are longer and wider than the body. Antennæ slender, nearly filiform, compressed; ¾ the length of body ♂, ½ ♀.

The single species is

T. Harrisii, Lec. J.A.P, ser. 2, 1852, II, p. 107. Length, 1⅛ to 1¼ inches = 30 to 35 mm. Hab. Newfoundland to Vanç., Coney Island.

SPHENOSTETHUS, *Hald.*

This genus is also represented by a single species, a shining black insect which by its tapering form suggests the family *Elateridæ.* The head is small, prothorax large, trapezoidal, smooth, somewhat convex, very obtusely toothed near base; elytra also black, tapering, dehiscent, punctured, tip finely serrate, margin and suture obtusely spinose. The antennæ are less than ½ the length of body, slender, slightly compressed and serrate.

The species is

S. Taslei, Buq. Ann. Fr. 1841, Bull. p. 39; *serripennis,* Hald. Proc. Ac. Phil. III, p. 126, Lec. J.A.P. ser. 2, II, p. 106; *denticulatus,* Westw. Arcan. Ent. I, p. 40, Length, 1⅛ inches = 29 mm. Hab. Middle States.

ELATEROPSIS, *Chev.*

This genus closely allied to preceding is again represented by a single species which like the preceding is a shining black insect but with a greenish tinge. It resembles *S. Taslei* in most points and is distinguished therefrom by the sides of thorax being crenulate and acutely toothed near the middle. The tip of the elytra is crenulate and they are not dehiscent. Antennæ ½ length of body slender and compressed.

The species is

E. fuliginosus, Fab. Syst. Ent. p. 160; Oliv. Ent. IV, 66, p. 37, t. 10, f. 39; Chev. Ann. Fr. 1862, p. 271; *erythromera,* Dej. Cat. 3rd ed. p. 344. Length, 1¼ inch. = 32 mm. Hab. Florida.

SUB FAMILY CERAMBYCINÆ.

This subfamily is defined by the following characters, viz: prothorax not margined, labrum separate from the front, front tibiæ not obliquely sulcate, palpi never acute at tip, antennæ always pubescent.

It is divided into the following groups:

I. Base of antennæ not enveloped by the eyes; antennæ with second
joint rather larger; front coxæ transverse, not prominent........**Callidioides.**

II. Base of Antennæ partly enveloped by the eyes; front coxæ not conical, though sometimes prominent; stridulating plate (absent only in *Molorchus*) large, never divided; ligula membraneous (except in the group *Oemes*); 2nd joint of Antennæ small (except in one genus of *Clytini.*). ...... **Cerambycoides.**

III. Base of Antennæ partly enveloped by the eyes, which are nearly divided, and moderately finely granulated; 2nd joint of antennæ longer than usual, front coxæ globose, widely separated, stridulating plate of mesosternum divided by a small furrow. (Body resembling a *Lamiide.*).............. **Atmioides.**

IV. Base of Antennæ not enveloped by the eyes, which are entire or emarginate, and usually finely granulated; front coxæ conical (except in *Disteniini*); stridulating plate of mesonotum divided by a smooth space or furrow. **Lepturoides.**

CALLIDIOIDES.

1. Ligula corneous, eyes variable. (*Asemini.*)................................ **2.**
Ligula membraneous, eyes finely granulated. (*Callidiini.*)...................... **7.**
2. Epimera of mesothorax normal, truncate at inner end........................ **3.**
Epimera of mesothorax acutely pointed inwardly........................ **6.**
3. Base of prothorax normal.. **4.**
Base of prothorax emarginate, filled with a thin plate....... .... **5.**
4. Eyes moderate, transverse, finely granulated, hairy.
Antennæ finely pubescent......... .... **Asemum.**
Antennæ coarsely pubescent................................ **Nothorhina.**
Eyes large, coarsely granulated, not hairy. .... **Criocephalus.**
Eyes divided, rather finely granulated........................... **Tetropium.**
5. Thighs clavate, prothorax with a single lateral acute spine.. .... **Opsimus.**
Thighs not clavate, prothorax with two acute spines................ **Dicenthrus.**
6. Middle coxal cavities widely open externally................. .. **Smodicum.**
7. Mesonotum with a large, undivided very finely striate stridulating surface...... **8.**
Mesonotum polished, with large scattered punctures........................ **9.**
Mesonotum punctured and pubescent at the sides, with a medial stridulating surface.. **10.**
8. Hind coxæ not prominent, thighs slender........................ **Gonocallus.**
Hind coxæ prominent, thighs clubbed.
Metasternum with scent pores.
Elytra with ivory lines .... **Physocnemum.**
Elytra uniform................... .... **Rhopalopus.**
Hind coxæ not prominent, thighs clubbed; metasternum without scent pores.
Prosternum broad or moderate, hind coxæ inclosed by side pieces and 1st ventral segment.................................. .... **Hylotrupes.**
Prosternum very narrow, pointed, hind coxæ not inclosed; prothorax rounded.
Phymatodes.
9. Mesosternum broad emarginate....................................... **Merium.**
Mesosternum obtusely triangular................................... **Callidium.**
10. More convex than usual, antennæ shorter and stouter............... **Xylocrius.**

ASEMUM.

The four genera first named above form the group *Asemini* of which *Asemum* is the typical form. The species are moderately stout in form with the antennæ never very long. The head and mandibles are small and inconspicuous. The thorax is rounded or angulated at the sides. The elytra are nearly parallel and rounded at the tip. *Asemum* is distinguished from its companions as indicated above by the eyes and the finely pubescent antennæ.

The species may be separated by the following

SYNOPTIC TABLE OF ASEMUM.

Elytra strongly costate; thorax distinctly angulated at the sides near base.
Surface opake .... **atrum.**
Elytra barely costate; thorax rounded at sides
Surface opake; smaller .... **moestum.**
Surface lustrous; larger .... **nitidum.**

A. atrum, Esch. Bull. Mosc. 1830, II, p. 66.

This species is black densely and finely pubescent; elytra ♂ very dark, nearly black, ♀ often testaceous; obsoletely striate and with three strongly, developed costæ, sometimes irregularly interrupted; thorax variously sculptured and obtusely angulated at sides, deeply punctured; antennæ ♀ about ⅓ the length of the body, ♂ nearly ½; in both sexes serrate. Length 10—17 mm. = .40—.68 inches. Habitat, Western States.

A. moestum, Hald, Trans. Am, Phil. X, 1847, p. 35; Lec. J.A.P. ser. 2, II, p. 35; Dej. Cat. 3d ed. p. 354; *striatum* ‡ Kirby, Fn. Bor. Am. IV, 1837, p. 171; *fuscum*, Hald, l.c. p. 36; *juvencum*, Hald, l.c. p. 36; *substriatum*, Hald, l.c. p. 36.

This species is also black and densely pubescent; elytra varying from brown to black in color and somewhat in the striations, which are sometimes barely visible and sometimes quite distinct. The name *substriatum* has been applied to the form having the more distinct striæ and *juvencum* to the smooth form. It seems unnecessary to continue them. The thorax in all the forms is rounded at the sides, punctured at middle and variously not deeply sculptured. Antennæ as in *atrum*, 11-jointed and very short. Length 12—15 mm. = .48—.60 inches. Habitat, Lake Superior to Florida and eastward.

A. nitidum, Lec. New species II, S.M.C. 1873, p. 169.

This species is larger, more robust than above and is easily known by the less densely punctured thorax as well as the characters of the table. The color is black shining, fusco pubescent with short hair; thorax rounded at sides; antennæ ♂ ½ as long as body and stouter especially towards the base. Length 17½ mm. = .70 inch. Habitat, Oregon.

NOTORHINA, *Redt.*

This genus contains a single species resembling *Asemum* in general appearance, but distinguishable by the pubescent antennæ. Head as in *Asemum* in shape, and punctate; eyes nearly as large as in *Criocephalus* and deeply emarginate; antennæ hardly half as long as body; thorax rounded at sides, punctate and longitudinally excavated in the middle and rough with elevated points at the sides; elytra finely scabrous with two obsolete lines. The species is

N. aspera, Lec. Proc. Ac. Phil. VII, 1854, p. 18; 1862, p. 42; Ent. Rep. p. 60. Length 18 –23 mm. = .72–.94 inch. Habitat, Oregon and Vaucouver.

CRIOCEPHALUS, *Muls.*

The species contained in this genus also resemble *Asemum* though generally larger and more sculptured in the thorax. The characters of the genus briefly enumerated are: eyes large, coarsely granulated, not hairy, more or less emarginate. From Dr. Leconte's "New species" is taken the following

SYNOPSIS OF CRIOCEPHALUS.

A. Third joint of hind tarsi emarginate for half its length, the 4th joint consequently extending as far as the lobes of the 2d joint; elytra finely punctured.
  Antennæ and legs very slender, hind tarsi with 3d joint twice as long as wide; body more elongate, prothorax not wider than long, rounded on the sides, slightly roughened with elevated points .... **productus.**
  Antennæ and legs less slender, body less elongate, prothorax wider than long.
    3d joint of hind tarsi ⅔ longer than wide; prothorax rounded at the sides and slightly roughened .... **agrestis.**
    3d joint ½ longer than wide; prothorax angulated at sides and strongly roughened .... **asperatus.**

B. Third joint of hind tarsi bilobed, cleft nearly to the base, 4th joint received into the emargination, not extending as far as the end of the lobes; elytra less finely punctured; sides of prothorax rounded, scarcely asperated.
  Prothorax deeply impressed, 3d joint hind tarsi nearly twice longer than wide.... **montanus.**
  Prothorax feebly impressed, 3d joint of hind tarsi very little longer than wide.
    Prothorax very finely punctured .... **obsoletus.**
    Prothorax less finely punctured .... **nubilus.**

C. Eyes smaller, less prominent and more deeply emarginate than in the other species; prothorax and elytra finely punctured, the former rounded, not asperated, feebly impressed at the middle .... **australis.**

C. productus, Lec. J.A.P. ser. 2, II, p. 36. Length .9—1.00 inch. = 23—26 mm. Hab. Colorado, Oregon.

C. agrestis, Kirby, Fn. Bor. Am. IV, 1837, p. 140; Lec. J.A.P. ser. 2, II, 1850, p. 36; *foveicollis*, Dej. Cat. 3d ed. p. 354; *impressus*, Luczot Dej. Cat. l.c. Length .9—1.00 inch. = 22—27 mm. Hab. U.S. east of Rocky Mts.

C. asperatus, Lec, Col. of Kans. 1859, p. 19, (Smith. Cont. Knowl. XI). Length .9—1.00 inch. = 24—26 mm. Hab. New Mexico to Montana.

C. montanus, Lec. S.M.C. 1873, p. 170. Length .76—.95 inch. = 19—24 mm. Hab. Colorado.

C. obsoletus, Rand. Bost. Journ. II, 1838, p. 271, Lec. J.A.P. ser. 2, II, p. 196; *obscurus*, Lec. l.c.; *rusticus* ‡ Hald; *paganus*, Dej. Cat. 3d ed. p. 354. Length .94 inch. = 24 mm. Hab. Western New York and Canada.

C. nubilus, Lec. J.A.P. ser. 2, II, p. 36. Length .75 inch. = 19 mm.

C. australis, Lec. J.A.P. ser. 2, II, p. 35. Length .5 inch. = 13 mm. Hab. Georgia.

Explanation of Plate II.

1 Asemum moestum.
2 Homaesthesis integer.
3 Sphenostethus Taslei.
4 Criocephalus productus.
5 Mallodon dasystomus.
6 Prionus laticollis.
7 Tragosoma Harrisii.
8 Orthosoma brunneum.
9 Ergates spiculatus.
10 Stenodontes mandibularis (after Oliv).
11 Derobrachus geminatus (after Lec.).
12 Antenna of P. laticollis ♂.
13 " " P. imbricornis.
14 " " P. fissicornis (side).
15 " " " " (front).

☞ The Entomological Club of the A.A.A.S. will meet Sept. 3d, at 2 P.M. at the Hotel Lafayette, Broad and Sansom Sts., Philadelphia.

NOTES ON COLEOPTERA

By Lt. T. L. Casey, U. S. A.

HARPALUS, *Latr.*

H. lustrans. This name is proposed for Dr. Le Conte's *H. lucidus*, Proc. Ac. Phil. 1865, p. 104, which is preoccupied, it being applied by Moraw to a Japanese species; Beitr. Käf Jesso. I, 1863, p. 72.

SUNIUS, *Steph.*

S. similis, Aust. Dr. Le Conte states (Trans. Am. Ent. Soc. VIII. p. 180.) that he cannot distinguish *S. similis* Aust., from *S. longiusculus*. I have before me a specimen from Arizona which is much more robust than *longiusculus*, especially in the head, and in which the elytra are, when compared with the prothorox, very much longer than in that species; this last character is very striking. If the specimen refered to is the *S. similis* of Austin, which there is reason to believe is the case, the two species are undoubtedly distinct.

LITHOCHARIS, Er.

L. tabacina, n. sp. (Fauvel MS.). Form elongated, sides parallel. Pubescence of elytra rather long, sub-recumbent, dense, fine, piceous, much more sparse on the head and prothorax, more sparse and longer on the abdomen. Head quadrate, eyes very moderately prominent, situated at twice their length from the posterior angles; interocular surface feebly and evenly convex, finely, evenly and extremely closely punctate, punctures shallow and variolate, almost coalescent; antennal tuberculation prominent; antennæ as long as the head and prothorax together, slender, first joint as long as the next two together, second joint distinctly shorter than the third, joints five to ten nearly equal, about as broad as long, last joint longer and just perceptibly wider. Prothorax quadrate, smaller than the head; anterior and posterior angles rounded; surface punctured like the head; median line very fine and distinct. Elytra at base one-fifth wider than the prothorax, one-fifth longer than wide; sides parallel and very feebly arcuate; surface depressed, finely and somewhat transversely rugulose. Third and fourth ventral segment equal in width and as wide as the elytra, thence decreasing in width slowly anteriorly, rapidly posteriorly, fifth much the longest. Legs rather short and robust, slightly paler in color. Gular suture very strong posteriorly. Color throughout rather pale castaneous, elytra slightly paler. Length 4.5—5.2 mm.

This fine species appears to be so common, that to leave it longer undescribed seemed to me inexcusable in the present state of the science. The color exactly resembles some of the darker shades of the cured tobacco leaf.

Dermestis Mannerheimii, Lec. This species is undoubtedly distinct from *D. marmoratus*, Say.

The spines which so densely cover the middle tibiæ are long, acute and somewhat slender in the former, and very short, robust and rounded at tip in the latter. The first joint of the middle tarsus is distinctly shorter than the second in *Mannerheimii* and equal in length to the second in *marmoratus*, and the last joint is relatively longer and more slender in the latter. The club of the antennæ is much narrower, less flattened, much paler in color and more uniformly clothed with velvety pubescence in the former than in the latter. The small punctures of the penultimate and antepenultimate segments of the abdomen in the male, are relatively much larger in *Mannerheimii* than in *marmoratus*; in former they are surrounded by a rather large circular area, totally free from pubescence, which does not appear to be the case in the latter.

There are also differences in the form of the scutellum, depth of the depression at the base of the pronotum, position of the eyes, and also great differences in the size and in the color, length and density of the pubescence.

Ancyronyx variegatus (Germ.). This rather rare species occurs somewhat abundantly, adhering to the under surface of pieces of driftwood, in the small ice-ponds near Babylon, Long Island.

CRYPTOCEPHALUS, *Geoff.*

It is evident to all who have approached the genus *Cryptocephalus*, that its species must be separated with great caution; nevertheless the present form seems worthy of specific recognition, not on account of coloration, as this should be almost entirely ignored, but because of the evenly ovoidal form, both anteriorly and posteriorly. *Insertus*, Hald. is apparently the only species with which it can be compared, and all the specimens which I have seen agree in being much more squarly truncate behind than the type under consideration. It seems to be very rare.

C. ellipsoidalis, n. sp. Form elongate, oval; body regularly ellipsoidal; surface entirely glabrous, shining. Head immaculate. Prothorax dark, fuscous, immaculate with the exception of two irregular, indefinite, paler, clouded spots, somewhat approximate and situated near the base; surface not punctured. Scutellum moderate. Elytra punctato-striate, sixth row of punctures interrupted. A broad line of black originates at the base of each elytron and the two coalesce on the suture at the center, the united band becoming acute posteriorly. There are also a small detached humeral spot, one irregular spot at the middle attached to the exterior edge of the broad line, and a posterior and longer outer apical detached spot on each elytron, all of black; remainder of elytra rather pale yellow. Under surface fuscous. Legs fuscous, tarsi much darker. Length slightly less than that of *insertus*.

Two specimens, one in the collection of Dr. Horn of Phila. from Mass., the other collected by myself on Long Island; they exhibit scarcely any perceptible variation.

Anthicus californicus, Laf. I have found two specimens of this species in Delaware and two in New Jersey. According to Dr. Horn the lot from which Laferte described *californicus*, did not in reality come from California, but from Texas, which accounts in a manner for the present localition.

APION, *Hbst.*

After looking carefully over the tables and descriptions in Mr. Smith's paper on the genus *Apion*, without being able to identify it, I am forced to the conclusion that the following species could not have been represented in the material from which the synopsis was prepared, and I therefore feel called upon to describe it, in order to make our list of described species as complete as possible.

A. vespertinum, n. sp. Male. Form slender, very convex. Color grayish-black, luster metallic. Head as long as wide, eyes moderate, rather prominent; interocular surface flat, scarcely as wide as the eye, having two rows of impressed punctures; rostrum short and robust, twice as long as the head, very finely punctulate, rugulose near the base; antennæ black throughout, inserted at a distance from the eye equal to the length of the latter; scape robust, as long as the next two joints together, clavate, first joint of funicle robust, slightly longer than wide, second slightly shorter and much more slender, club elongated, acuminate and well developed, pubescence becoming much thicker and more fuscous in tint toward the tip. Prothorax nearly as long as wide, almost cylindrical, slightly wider at the base, very fully arcuate at the sides in front of the middle; surface regularly punctured, punctures impressed, round, interspaces as wide as the punctures, flat and coarsely granulated; in the middle and at a distance from the base equal to one-seventh the length of the pronotum, there is a well-defined, very deep circular puncture. Elytra together widest in the middle, where the width is nearly twice that of the prothorax; sides regularly arcuate; striæ deep, very finely and feebly punctured, intervals slightly wider than the striæ, convex and feebly rugulose; along the crest of each interval is a row of very minute punctures. Legs moderate, femora not tuberculate, tibiæ much longer than the femora. Length exclusive of beak 1.9 mm.—Female. Beak two and one-half times as long as the head, robust; antennæ inserted at a distance from the eye equal to one and two-thirds times the length of the latter, longer than in the male, club smaller and narrower, scape slender as long as the first and second funicular joints together, first joint of funicle much longer than wide, oval, much more robust than the scape, second scarcely more than one-half as long as the first: there is a minute furrow between the rows of punctures on the head, which does not appear in the male. The circular puncture of the pronotum is at a distance from the base equal to one-fifth the length. The prothorax is longer than wide. Length not including beak 2.2 mm. California.

The entire body is covered very sparsely with very long, narrow, cinereous scales, which resemble hairs; they are recumbent and generally grow from the punctures. The species appears to be very distinct by reason of the clearly defined, deep, circular puncture near the base of the prothorax, and the four specimens which I have under examination exhibit no perceptible variation, except that due to sex. The humeral angles of the elytra are well developed.

Apion obsoletum, Smith. Occurs in great abundance amongst the tall weeds crowning the banks of the Susquehanna river opposite Wilkes-barre. In the smaller specimens with the shorter beaks (the so-called males) the scape of the antennæ is equal in length to the next two joints together, and is inserted at a distance from the eye equal to the length of the latter, while in the specimens with the longer beaks, the scape is equal in length to the next four joints together and is inserted at a distance from the eye equal to one and two-third times the length of the latter.

Society News.

At the May meeting of the Society 8 members were present, Mr. Smith in the chair. The correspondence of the Society was reported as very large, and portions of general interest were read. A letter was received from Dr. A. S. Packard, Jr., acknowledging his election as an Honorary member. A large number of donations to the library were received during the past month, and an exchange of publications with the American Museum of Nat. Hist. was made. Mr. Roberts gave his experience in collecting *Elmidæ* at the Clifton Excursion of the Society. Four species were taken on roots and sticks in the water. At first sight nothing could be discovered on the sticks, but after careful search, and when the stick began to dry off, minute points scarcely relieved from the surface of the wood began to move, and with a little practice the specimens could be perceived and picked off with a knife blade. The bad fortune following many in collecting these forms can be explained by the fact that even a tolerably close search on a stick fresh from the water will fail to reveal the species; the stick must begin to dry before the beetles begin to move. Mr. Schwensen called attention to foods habits of some *Cryptocephalidæ*. Some species are very local favoring single species of plants, others are omnivorous found everywhere. Mr. Smith showed a simple oven for drying and inflating larvæ; formed of a spice box fastened to an upright which in turn was fastened to a platform on which was a small spirit lamp. General discussion on methods of preserving larvæ so as to retain their natural color and shape then followed until the meeting adjourned.

June meeting.—Mr. M. L. Linel of Brooklyn was proposed for membership by Mr. Weeks. A paper on the habits of some *Cicindelidae* by Warren Knaus of Salina, Kans., was presented for publication. Mr. During exhibited an apparatus for cutting larva and cocoons from trees; a height of 25 feet could be reached by its means.

Mr. Weeks explained how he secured all of the living material taken in the beating net. The whole rubbish accumulated in the net is dumped into a long narrow bag which is tied at the ends; when reaching home the contents of this bag are transferred to a large earthen jar fitted with a tight wooden bung in the centre of which is an opening sufficiently large to admit the mouth of a large bottle which is inverted over it. From the inner side of this bottle several strings proceed long enough to reach to the bottom of the jar. The insects aiming for the light climb up the strings into the bottle and may be transferred into the cyanide bottle without difficulty. The advantages of this method are that nothing escapes from the sweep net while picking out desiderata, and that there is no necessity of looking over the rubbish to pick out the insects.

Mr. Smith read a paper on some structural peculiarities of the Noctuidæ with reference to their Geographical distribution calling attention to the fact that the northern species referred to *Plusia* had narrow ovate eyes, and spinose tibiæ and were not congeneric with the more southern forms. *Caloplusia* is proposed for these forms, which have also usually yellowish secondaries.

Members are hereby notified that there will be no meetings during the months of July and August.

Explanation of Plate III.

1 Antenna of *Papilio*. Club gradual, regularly arquate.
2 " " *Pieris*. Club distinct.
3 " " *Colias*. Club obconic, truncate at tip.
4 " " *Argynnis*. Club broad, spatulate (spoon shaped).
5 " " *Aegiale*. Club terminating in a short acute point.
6 " " *Pamphila*. Club with an abruptly recurved tip.
7 " " *Eudamus*. Club very gradual, pointed, greatly recurved at tip.
8 " " *Deilephila*. Form prismatic, tapering to tip, which is abruptly recurved.
9 " " *Philampelos*. Tip gradual and moderately curved.
10 " " *Macroglossa*.
11 " " *Attacus*. Lengthily bipectinate.
12 " serrate.
13 " setaceous; most *Noctuidae*.

14 Wings of *Papilio*. Veins numbered; primaries. 1 *vena internalis* or *dorsalis*; dorsal or internal vein; often termed *submedian* vein. 2, 3 and 4 are termed median nervules, arising from the *median* vein. 5 and 6 are discoidal nervules, arising from the vein closing the discal cell. 7 to 11 are branches from the subcostal. 12 *vena costalis* or costal vein. Secondary. 1 internal or free vein. 2, 3 and 4 branches of median vein. 5 discoidal vein; termed the independent in *heterocera*. 6 and 7 branches of the subcostal. 8 costal vein.

15 Venation of *Thyridopteryx*: aberrant: median cell divided, internal vein branched, and in primaries furcate at base.

16 Secondary of *Cymatophora* (*Bombycia*). Showing the juncture of the costal and subcostal veins.

17 Wings of *Deilephila*. Primary: d. dorsal vein furcate at base. Secondary: a. an oblique branch between costal and subcostal veins. 1a & 1b 2 internal or free veins.

18 Wings of *Hepialus*. Both wings 12 veined, the median cell divided, accessory cell present; aberrant.

19 Wings of *Zygaena*. Primaries with 2 simple dorsal or internal veins. Secondaries with an oblique branch between costal and subcostal veins (*a*).

20 Wing of *Agrotis*. Showing typical noctuid venation; dorsal vein of primaries furcate at base (d): accessory cell present, at upper outer margin of discal cell.

21 Wings of *Aegeria*. Internal vein of primaries wanting. Secondaries without costal vein.

22 Head of *Noctua*. *a* eyes hairy, unlashed; *b* eyes naked, fringed above and below with long hairy lashes.

23 Head showing location of *ocelli* (*a a*).

24 Head of *Papilio*. Antennæ approximate, head narrow.

25 Head of *Hesperia*. Antennæ widely separated, head very broad; *a*, a bristly tuft at base of antenna.

26 Anterior leg of *Nymphalis*. Tarsi wanting, tibia brush like.

27 Anterior tibia of *Papilio*, *Hesperia* and the *Heteroceri* generally; showing *a* the tibial epiphysis; single spur of anterior tibia of some authors.

28 Tibia spinose.

29 Tibia of *Chrysophanus* ♂. Tibia normal, tarsi exarticulate, consisting of a single long joint with a corneous, claw like tip.

30 Claw of tarsi, often simple. more usually dentate as in figure.

31 Palpus. Varying much in proportion and shape in the different families, but among the macros never with more than 3 joints.

32 Serrate and bristled antenna greatly enlarged.

33 Bend and tuft found in the ♂ antennæ of some Deltoids.

An introduction to a Classification of the N. A. Lepidoptera.

BY JOHN B. SMITH.

How do you know this is a *Bombycid*, and this a *Pyralid*? These are questions not infrequently asked by collectors aud young entomologists when their material is named for them, and they discover that their arrangement according to apparent resemblance, was widely at fault. Now although an old collector or an advanced student can tell almost at a glance, to which group or even genus, a species is referable, yet this knowledge has come to him only by years of collecting, or by close study of large collections and a free use of literature, and this intuitive knowledge cannot be imparted. An explanation of the technical characters of the group or families is incomprehensible, because unfortunately few indeed are acquainted with the characteristics that are used in family classification. To give an answer to these questions—to furnish in concise, yet sufficiently clear terms the characters of the various families and at least their principal genera—to illustrate as much by pencil as by pen, the structural peculiarities of the Lepidoptera, is the object of the present series of papers.

First will be given a brief review of the main characters used, then a translation and modification of Dr. Herrich-Schäffer's table of families, which though not entirely accurate when applied to our fauna, still forms the basis of the present classification of American Lepidoptera, and must therefore be studied. Then will come a more complete definition of each family, exceptions and relationships will be noted, a brief synopsis of at least the leading genera, and the characters used in generic separation will be given. Finally, will be given a synoptic classification of the Lepidoptera, reference being had only to the American forms.

The first character made use of is found in the antennæ, which are either enlarged or clavate at tip, as in the *diurnes* or *Rhopalocera*, prismatic, as in the *Sphingidae*, and setaceous or bristle form, as in the *Bombycidae*, *Noctuidae*, and *Geometridae*. The families in which the antennæ are not clavate at tip are classed as *Heterocera*. Of the clavate antennæ there are many modifications, the chief of which are shown on plate III. Fig. 1, of *Papilio*, has an elongate, regularly arquate club; in f. 2, *Pieries*, it is conic and somewhat flattened; in f. 3, *Colias*, cylindric obconic, obtusely terminated at tip; in f. 4, *Argynnis*, it is abrupt, flattened and somewhat spoon shaped; in f. 5, *Aegiale*, it is gradual, cylindrical. suddenly terminating in an acute tip; in f. 6, *Pamphila*, it is more abrupt, and with an abruptly bent and longer, acute tip; in f. 7, *Eudamus*, the club is very gradual, re-curved toward, and gradually terminating in an acute tip. Among the *heterocerous* antennæ that of the *Sphingids* is usually prismatic, more or less serrate and sometimes pectinate in the male, and often terminating in an acute spine. Fig. 8, shows that of *Deilephila*; f. 9 shows a somewhat different form in that of *Philampelos*; while f. 10 shows the form in *Macroglossa*. A pectinate antenna is shown by f. 11; a serrate, at f. 12; and a simple setaceous antenna at f. 13. There are other modifications which will be noticed further on, but the presented types are all that are at present important.

The legs, are of some importance in family classification, and more particularly the anterior pair. In the *Rhopalocera* they may be complete in both sexes, complete in ♀ and more or less aborted in the ♂, or the fore legs in both sexes may be aborted. The plate shows figures of *Papilio*, *Nymphalis*, and *Chrysophanus* ♂, as illustrating the variation. It is somewhat curious that in a subfamily of the *Deltoids* we again find a somewhat similar abortion in the ♂, though very different on the whole from that in the *Nymphalidae*.

The variation in tibial armature has rather a generic than family value, and will be again referred to.

It is the neuration of the wings, that in Herrich-Schäffer's system plays the most important part, and which it is absolutely necessary to study to refer with certainty an aberrant or unusual form.

On the plate are given figures sufficient to illustrate the following table and explanation; but it is of great importance that the student try and follow the explanation in nature, as the part or vein once recognized will be always remembered.

To prepare wings so that they can be examined, soak them for a moment in alcohol to remove the fatty matter, then place them in a saturated solution of chloride of lime until the color is all gone—this will take only a short time—then wash thoroughly in water, to which a few drops of hydro-chloric acid may be added, until all trace of the lime is gone, then dry on a slide, plate or blotter, and mount as most convenient for examination; either on a glass slide in balsam which has been diluted with chloroform, or on a card by means of balsam, gum, or any other desired medium except shellac. In this way the venation can be thoroughly studied, but it of course involves the destruction of a specimen. In practice. and after the student is familiar with the typical form of venation, only a limited portion of the wing need be examined, and this can be done by carefully denuding of scales, so much of the underside, as is necessary to expose the venation which is to be examined. The denuding can be done with a fine sable or camels hair brush, and the wing being sustained by the thumbnail of the left hand, will still remain perfect on the upper side.

Various methods of nomenclature have been in use to designate the nerves or veins: they have been divided into nervures and nervules, veins, venules and veinlets, and special names have been given to each branch. The simplest method is that adopted by the German entomologists of merely numbering the veins, and this method I use in this paper, giving a number to each vein that reaches the costal or outer margin, number one being the vein reaching the margin nearest to the anal angle.

Normally the primaries have 12, the secondaries 8 veins, though the internal veins whether one or two in number count only as one, for reasons hereafter explained; there may be and usually are 9 veins though counting as but 8. The costal margin of primaries is usually thickened to the apex, and forms the costa. or costal vein of some authors which bears no number. From the base to the costal margin beyond the middle, runs vein 12 of the numeral system and this is the *vena costalis* of Herrich-Schäffer. Below the costal, also from the base runs the discal vein (*subcostal* of H. S.), which gives out mediately or immediately six branches. The first and second of these, No. 11 and 10 in the numeral system, to the costa, before the apex; No. 9 may arise out of 10, or out of the main stem. No. 8 usually runs to the apex, and is generally one tine of a fork out of the main stem. No. 7 is variable, but usually from the main stem, while No. 6 is normally from the extreme end of the discal vein when there is no accessory cell; or, if there is one, then from the middle of the lower margin of that cell. The accessory cell, is a small usually diamond shaped cell at the upper outer angle of the discal cell, and is formed generally by the junction of veins 8 and 9 near their inception, though this origin may be and indeed generally is confused and not readily traceable. The cell itself when present, is easily seen. These veins 6—11 form the discal or subcostal system. From the base, running through and rather beyond the middle of the wing, is the median vein which gives out four branches, all of which run to the outer margin. Of these, the lower, No. 2, or submedian of some authors is usually from about the middle of the wing to near the hind angle. The others are usually close together from the end of the vein. From the end of the discal, to the end of the median vein, is usually a fine cross vein which closes the discal cell. Beneath the median vein from the base to the outer margin at or near the hind angle, is the internal vein or veins: No. 1 of the system. This may be simple and single throughout its course, or it may be furcate toward the base. Sometimes a complete cell is formed, but more usually there is only a recurved spur near base. This furcation is given great value by Herrich-Schäffer and is relied upon by him to isolate the *Noctuidae*.

The range of variation in venation of primaries, is comparatively limited: rarely there are two internal (dorsal) veins counted as 1, and 1a; usually there is one, and in the *Sesiidae* there is none; often an accessory cell is present; in the *Noctuidae* usually, in the *Bombycidae* rarely. Veins 6 to 10 are the most variable, but their variations have sometimes not even a specific value, and are never a family characteristic. Rarely the median cell is distinctly divided by a complete vein, but in most forms of *Heterocera* a distinct fold or rudimentary vein is traceable. The position of v. 5, is of great importance in classification. Usually, and in the *Noctuidae* always, it is close to v. 4, but occasionally it is nearer to v. 6 than 4, and this is the usual structure in the *Geometridae*.

Occasionally the primaries have but 11 veins, but the families in which this obtains are so few and either not represented in our fauna at all, or are so peculiar in other respects, that there is scarcely a need to refer to venation at all.

In the secondaries the range of variation is greater. In the aberrant *Hepialidae* they are similar in venation to the primaries and are 12 veined. In almost all other families, 8 is the normal number save that there may be two or three internal veins classed as Nos. 1a, 1b and 1c respectively. The costal thickening is always wanting: the costal vein is usually present. Sometimes the subcostal forms the margin of the wing itself. It is to be noted that the terms costal and subcostal veins have been confused, and this must be borne in mind when using the table of families and comparing descriptions of venation in other works. Rarely in both wings there is a cross vein between the subcostal and costal vein, and this is given considerable weight: occasionally the subcostal and costal veins unite near base for a short distance then separate again and form thus a narrow basal cell. This character also has been given family value. The discal or subcostal vein usually divides at the end of the discal cell, though in at least one family (*Noctuo-bombycidae*) this is not the case. The median vein has three branches, and they run tolerably constant. There is usually a more or less distinct transverse vein closing the cell, and from some point in this. v. 5 runs to the outer margin. This vein varies greatly in distinctness, and not belonging to any of the series running to the base of the wing, it is termed the "independent". Its relative position, and its strength or entire absence have been given considerable value. This v. is always No. 5, and in order that it may be so, all the internal veins are counted as one. Of the internal or "dorsal" veins of Herrich-Schäffer there are from one to three but usually, at least in the *heterocera*, two. Rarely, in a few small aberrant groups the secondaries are provided with an accessory cell and rarely also is the discal cell divided, though often a distinct fold is traceable through it. In both wings the internal veins are usually without branches, but in some few aberrant groups they are curiously furcate. More detailed description of the various peculiarites of venation may be left until the discussion of the families, and reference is here made to the plate on which is given the venation of the normal and aberrant groups; common types being selected to enable the student to follow the description and figures in nature. The explanation of the plate will furnish any further details that may be necessary to an understanding of the table of families.

It may be added only that some families are furnished with a spine at the base of secondaries, termed the *frenulum*, and the presence or absence of this is accorded family value.

Mr. Hulst at p. 20 ante, has discussed this organ as it appears in the *Catocalae* and to that article I refer the student.

(To be continued.)

MISCELLANEOUS NOTES.

Notes on the habits of Cicindelidæ.

The species found in Salina, Co., Kansas, are as follows:

Tetracha virginica, L. Common, appears from 1st of July to September, apparently does not have holes of its own, but seeks shelter wherever it can crawl into a crevice. I have taken them quite numerously by overturning cakes of dried mud on the banks of small ponds: it is crepuscular.

C. Belfragei, Salle. This species not very largely represented in collections, occurs from the middle of July to the middle of September. It is very peculiar in its habits. I first took a specimen July 6th, 1883. while mowing grass. Something clogged the sickle, and I got off to look after it, when a beetle darted from under the fallen swath into the standing grass. I gave pursuit, and in a few minutes had the first specimen of *C. Belfragei* in my collecting bottle. A few days afterward in company with my friend, Mr. Warren Knaus, we put in an afternoon collecting in the meadow. We walked up and down the field, fairly melted with the sultry heat, for two or three hours with no success, when at last, about four o'clock, I caught sight of one darting across the road a few feet ahead of us, and during the next hour we captured five specimens. They are rarely found during the heat of the day, but like the *Tetracha*, are crepuscular. I am satisfied that they have no burrows of their own as I have taken several specimens by overturning hay cocks. And I have never taken them at an altitude of fifty feet above the Smoky hill river bottom.

C. scutellaris, Say. Occurs abundantly in limited localities in sandy ravines among hills during May and June.

C. purpurea, Oliv. Common here, is probably too well known to all Coleopterists to need any description of its habits.

Var. *Audubonii*, Lec., is found in the same localities as *C. purpurea.*

Var. *splendida*, Hentz. The earliest species found in the spring; I took two specimens Feb. 28th, 1883. This variety is notable for its great variation in markings. I have several times observed them with a large bug, (*Lygaeus trivittatus*), in their mandibles.

C. venusta, Lec. Rare, taken in company with *S. scutellaris* in the same season.

C. vulgaris, Say. Is found occasionally on sandbars in the river.

C. repanda, Dej. Abundant in same localities as the last.

C. 12 guttata, Dej. Frequent; prefers very wet and muddy spots on sandbars, and I have several times observed them swimming across small pools.

C. punctulata, Oliv. Abundant everywhere from July 1st to the middle of September, at all times of day, from daylight until dark and occasionally they fly to a light at night.

C. lepida. Rare, solitary; occurs only in localities where salt exists to some extent. When approached they fly directly up in the air and then fly over your head and alight behind you; whether they invariably fly in this manner I will not say, but all that I have taken here have done so
ALFRED W. JONES.

* * *

Mr. Ottomar Reinecke sends a slip from his paper, the "Buffalo Freie Presse" of Aug. 12, 1884, recording an invasion of *Phytonomus opimus*, Lec., said to be an imported species; a free translation of which is as follows. Last season the writer received specimens of this species from Rochester and during the past two weeks the beetles, favored by the prevalent east winds, have appeared in immense numbers. During the last few days pedestrians may have noticed mud colored pellets moving on the pavement. This closely examined proved to be the *Curculio* above named. Thousands were trodden under foot and destroyed. Many were carried by the wind into the lake, and not a few met their death in this uncongenial element. However, the beetles have the power of closing their stigmata and remaining in an apparently lifeless condition for some time. At date the shores of the lake are covered with millions of the beetles. Cast up, they soon recover from the effects of their involuntary bath, and hastening to the nearest clover fields fulfill their life mission—i.e. deposit eggs—and then die. The egg transforms into a footless grub living in stems and roots of clover and causes enormous damage, as may be witnessed at present by thousands of acres of burnt vegetation in the vicinity of Rome, Utica and Syracuse.

How to combat this pest is another problem for the farmer—or the economic Entomologist.

* * *

Allorhina nitida was common through the Carolinas and Georgia attacking the shade trees. Near Raleigh on avenue of Walnuts was specially infested. They appeared to bite through the bark making a hole ⅛ inch wide and ½ to ¾ long. The bark seemed to be softened with some exudation from the mouth. Most of the cuts I examined reached only to the wood, but a few were much deeper. In the deeper holes I found *Cryptarcha ampla* curled up.

Trichius delta was abundant in North Carolina upon a species of *Achillia*. I found only one specimen of *Trichius affinis* in its company.

Brachys tesselata was remarkably abundant on scrub oak at Manly, N. C. Manly is a village in the heart of the turpentine district occupying a clearing in the pine forests. The oaks have sprung up wherever the pines have been destroyed by being cut for their sap. The species seemed to be very local and I did not find a single specimen elsewhere.*

I captured one specimen ef *Tetracha virginica* at Cheraw in a rather curious way. It had rained heavily during the day and the streets were rivers. I was picking my way to the depot when I saw this specimen running quite frantically about the roots of an old oak. It is said to be nocturnal in habits and had been drowned out of some hiding place.

Elaphrus ruscarius I found in numbers on Staten Island this spring. A new railroad has been projected and carried as far as grading the track which at a point about a mile from Richmond runs through the woods. The *Elaphrus* were sunning themselves on this track. Many good things were taken in the trees cut down; among them several *Cucujes clavipes.*

Epicauta convulvuli and *E. strigosa* were very abundant near Sanford, N. C., on a wild *Convulvulus.* I did not find either elsewhere. Near Charlotte I found a few specimens of *Rhyssematus lineaticollis* upon it. All of these were eating the flower itself.

In a patch of woods known as "Blood root Valley", last winter several specimens of *Cymindis americanus* were taken for the first time on Staten Island: *Pterostichus superciliosus* was also taken; one specimen.

CHAS. W. LENG.

* * *

During the latter part of July and early in August I collected at Manchester, Vt.; but with scarcely half my usual success. Lepidoptera could scarcely be found at all during the day, so Coleoptera only were sought. Beating and sweeping proved so unproductive that they were abandoned in disgust. Search in decayed logs yielded a few specimens of *Atemelus cavus* in an ant's nest. The majority of specimens were found at one point in the nest in a comparatively solid portion of the log, and near to the midst of the colony.

---

* In precisely similar situations on Cape Cod, many hundreds of *B. ovata* and *B. aerosa* were taken. J. B. S.

Collecting dung and water beetles proved most productive. A pail of water was taken into the pasture, and a likely dropping being selected it was deposited into the pail by means of a shovel. Immediately the inhabitants began to desert their homes and swim off for dear life—only to find death in the Alcohol bottle—365 specimens were taken from a single moderate sized dropping, and many escaped. *Aphodius fimetarius* were not counted and certainly numbered nearly 100. Several species of *Aphodius* were taken; *Dialytes*, *Ataenius* and several other *coprophagus* genera had a fair representation, white *Staphylinidae* were taken in immense numbers and considerable variety. *Aphodius fossor* was moderately plentiful but seemed very local, found in a single lane only, and only in one portion of that lane. Many small species new to my collection, and not generally represented in collections where taken in numbers.

I noted also that droppings not more than 24 hours old were most productive. If older everything was gone; if much fresher little except *fimetarius* was found.

Stenus is known to be subaquatic in its habits and I found it in the muck with *Philhydrus.* I also found it in the water net after dragging aquatic vegetation. Every netful would contain a lot of frog spawn which was at first cast aside; noticing a specimen of *Stenus* half imbedded in one mass, further attention to the matter developed quite a number of specimens, apparently two or more distinct species, entirely imbedded in the masses of spawn brought up from the bottom. I do not recollect ever seeing this noted anywhere.

Afterward in searching running streams for *Elmidæ* I met unexpected success in discovering *Parnidae.* Examining chips I found a few specimens of a *Helichus* and turning over a stone in an eddy, I found one or two two crawling on the bottom after the sand settled. Appropriating them I was about to turn away when I saw another, and one by one rather more than a dozen were taken from the same spot.

I found that anywhere I turned a stone and made a small cavity, *Helichus* would somehow appear in some numbers and continue to appear until I got tired picking them out.

Aquatic Coleoptera were also taken in numbers, and in (to me) a somewhat unusual manner. In a swampy portion of the medow I started to clean out a spring hole. Taking out a handful of muck, I observed floating on the water a few beetles. They were annexed, and more muck removed with the same result. For two hours or longer I continued this, finding the beetles imbedded in the soft mud around the roots of grasses. *Hydrophilus*, *Philhydrus*, *Hydrobius* and *Cercyon* were principally represented, though an occasional *Dytiscid* was found. Quite a large number of *Hydrophilidae* were taken, including *Helophorus* and *Hydrochus*.

C. H. ROBERTS.

Editorial Notes.

In this number we give a few extracts from the note books of collectors and some brief extracts from correspondence. Everywhere the season has been bad for collecting, and this has been our experience. Cold and wet weather seems to have been general in the Eastern and Middle States, and in consequence, comparatively little has been found. Seashore collecting else very productive, has this season yielded scarcely anything. Beating and sweeping was never so unproductive, while sugaring for moths was a discouraging task.

* * *

From Lt. T. L. Casey we have a Revision of the *Cucujidae* of N. A. (Tr. A. E. Soc. XI, pp. 69—112. Plates IV.-VIII.) Lt. Casey is a new worker in the field, and if his future papers show the same thoroughness and conscientious research which characterizes this, coleopterists may congratulate themselves on such an accession to the ranks of active workers.

* * *

From Dr. Horn we have "Notes on the species of *Anomala* inhabiting the United States" (Tr. A. E. Soc. XI, 157—164) and "Synopsis of the United States species of *Notoxus* and *Mecynotarsus*" (ibid pp. 165—176). It may suffice to say that these papers are fully up to the Doctor's high standard.

* * *

It is an unfortunate and well known fact that Entomological journals never pay. The Bulletin is no exception to the rule, but we are anxious to make the subscriptions go as far as possible. Will those of our subscribers who have not yet sent in their subscriptions please do so at an early date? Our expenses have been exceptionally heavy thus far, and every dollar helps pay the printer.

* * *

From Lt. Casey we have another paper "Contributions to the Descriptive and Systematic Coleopterology of North America" (Part I with 1 Plate. Published Phil., Aug. 1884). This forms a pamphlet of 60 pages, in which are described rather more than sixty new species, and three new genera (1 *Carabid*, 2 *Staphylinid*). There are synoptic tables of *Euæsthetus* and *Edaphus*. The new species described are of all families. A valuable feature is the distinction of the species of *Lachnosterna* usually confused under the term *fusca* in collections. A goodly number of *carabidae* are described among which, we are sorry to say, several in genera not yet studied. New species of *Harpalus*, *Amara*, *Bembidium*, *Tachys*, etc., add only new names to our list and nothing to our knowledge. A remarkable feature is the separation of *Harpalus veridiæneus* into five distinct species. As the pamphlet is a fugitive publication and not accessible to the mass of Coleopterists we reproduce the table separating the species. Of course the table applies only to those metallic green specimens that run as *viridiæneus* in collections.

Epistoma bearing two closely approximate and unequal setigerous punctures at each anterior angle; also two, more widely separated. in the middle, nearly on a line with the pairs at the angle .... **viridiæneus.**

Epistoma bearing two closely approximate and nearly equal setigerous punctures at each anterior angle, and in addition, two rather more distant punctures in the middle and near the posterior margin .... **convictor.**

Epistoma bearing two closely approximate setigerous punctures at each anterior angle .... **canonicus.**

Epistoma having but one setigerous puncture at each anterior angle.

Larger species. Head large; elytra wider than thorax .... **lustralis.**

Smaller species. Head smaller; elytra as wide as prothorax...... **ænescens.**

We are not quite certain that this separation without a study of allied species or of all the species of the genus is advisable. We have hitherto refrained from attempting to separate the large number of specimens we have as *viridiæneus*, fearing that on the same basis we may discover even more species. However, very little is know of *Harpalus*, and Lt. Casey may be entirely warranted in his conclusions.

* * *

Not strictly Entomological, but interesting to all students of nature are some recent issues of the "Humboldt Library" the aim of which is to bring standard scientific literature within the reach of those whose length, or a more correctly shortness of purse, does not enable them to purchase the ordinary editions. Of the works recently issued are to be recommended Bates, Naturalist on the River Amazon; and Darwin, Origin of Species.

The publishers deserve hearty support in their very laudable effort thus to bring such literature within the reach of all.

* * *

Transactions No. 5, of the Ottawa Field Naturalists Club, is at hand, and is a pleasant surprise. The matter contained in it is quite as valuable as that contained in many volumes with more pretentious titles. Of interest for Entomologists is a list of Ottowa Coleoptera. Local lists are always of value, and especially to the systematist in generalizations of geographical distribution. This list is compiled by Mr. W. H. Harrington and shows that gentleman to be a careful collector, and a close observer. We regret that other orders are only very generally touched upon. Why *will* students rush into *Coleoptera* and *Lepidoptera* when such wide unworked fields exist in other orders, Diptera and Hemiptera especially.

An introduction to a classification of the N. A. LEPIDOPTERA.

(Continued from p. 74.)

It has been suggested that not all students understand the use of a tabular synopsis such as the following; a few words of explanation may not be out of place therefore.

Suppose an unknown moth to come to hand; to ascertain its family, reference is had to the table. The first character made use of is the number of veins. If your insect has 12 in each wing it of course is a *Hepialid.* If the wings are tolerably equal, and more than 8 veined, you find the number 24 at the end of the line containing that character. That reference is to a similar number beginning a line, and turning to No. 24 we find only a single family under it, and to that your insect must belong. Assume however that you find "Wings not equal, secondaries with no more than 8 veins."—2. Refer to 2, beginning a line, and you find the antenna used to separate the other families into three groups. Suppose the antennæ are not clavate or clubbed at tip. The reference then is to 3. Turning to 3 we find that the number of dorsal or internal veins forms the next character. Assume that the primaries have but a single internal vein; the reference then is to 6. Turning to 6 we find the presence of an oblique connecting vein to be used. Assume the insect has none, and you are referred to 9. At 9 the *micro-lepidoptera* are isolated. Assume that your insect has but two internal or dorsal veins: the reference is to 10. At 10 the presence or absence of the frenelum becomes important. Assume its presence, and the reference is to 14. At 14 the question of whether or no the dorsal vein of primaries is furcate toward base, arises, and finding that it is, the reference is to 15. At 15 the presence or absence of ocelli becomes important. Assume them present, and the reference is to 20. At 20 the subcostal vein of secondaries must be examined. Assume it free, and the reference is to 21. Now the position of vein 7 of secondaries determines the family to which your insect belongs. Does it arise from, or before the end of the cell? If the former, it is a *Noctuid,* if the latter, a *Cymatophorid* (*Noctuo bombycid*).

I have been thus full in explaining how the table should be used because I have found many who did not well understand the system, which is yet so simple, precise and essentially complete.

SYNOPSIS OF FAMILIES,

after Herrich-Schæffer.

1 All the wings of equal structure, secondaries a little smaller, with 12 veins; an accessory cell between veins 4 and 5. 9 and 10 out of a common stalk out of the costal next to the root: a vertical branch to the anterior margin, no ocelli. no frenelum..**Epialoidae.**

Wings not equal, secondaries with no more than eight veins.............. 2

Wings nearly equal, all wings with more than 8 veins 24

Wings divided or split.............. 25

2 Antennæ clavate; no ocelli, no frenelum, median cell not divided .,..**Rhopalocera.**

Antennæ clavate; with sharp acute point; ocelli; frenelum; divided median cell **Castniaria.**

Antennæ bristle form, (setaceous) rarely filiform and seldom thickened before the tip.......... 3

3 Primaries without dorsal vein; no ocelli; secondaries with costal vein forming margin of wing..**Sesioidae.**

Primaries with 2, secondaries with 3 dorsal veins..........................4

Primaries with 2 dorsal veins which are connected; the anterior bends backward and sends out several branches; all wings with accessory cell....**Oecetecina.**

Primaries with one dorsal vein, from the middle of which arises a branch which bends backward no accessory cell...... ....**Animulina.**

Primaries with a dorsal vein, which forms toward inner margin a long fork.... **Psychina.**

Primaries with two dorsal veins; out of the inner, 2 or more veins to the inner margin: secondaries with 7 seperate veins; the 8th out of the subcostal.... **Megalopygina.**

Primaries with a single simple dorsal vein.................. 6

4 Secondaries without costal vein; last branch of subcostal out of the apex of middle cell......................................**Pyromorphina.**

Secondaries as before: with an oblique branch between costal and subcostal veins.... 5

Secondaries with costal vein, free, or very close to the root; without cross vein, connected with subcostal or arising out of it; no ocelli............**Cossina b.**

Secondaries with costal and subcostal veins free; middle cell of the primaries not divided... . ...**Heterogynina.**

5 Ocelli present.................................... ....**Zygaenoidae.**

Ocelli wanting.................................... ....**Cossina a.**

6 Secondaries with an oblique connecting branch between costal and subcostal arising behind the middle...7

Secondaries without this connecting branch................. 9

7 Dorsal vein of the primaries divided towards the base..............**Sphingina.**

Dorsal vein not furcate; no frenelum............................ 8

8. V. 5 of each wing from the same point with 4. Primaries with 11 veins...... **Endromoidea.**

V. 5 of secondaries nearer 6 than 4. Primaries with 12 veins... ...**Lasiocampa.**

9	Secondaries large, never lanceolate, with one or two free inner veins	10
	Secondaries lanceolate; with three dorsal veins; or with venation obsolete	**Microlepidoptera.**
10	Secondaries without frenelum	11
	Secondaries with frenelum	14
11	Dorsal vein of primaries not furcate toward root	12
	Dorsal vein of primaries not furcate toward root, vein 5 of secondaries nearer to 6 than to 4	13
12	Primaries without accessory cell	**Bombycoidea.**
	Primaries with accessory cell giving rise to veins 7–10	**Cilicina.**
13	Tongue wanting	**Saturniina.**
	Tongue strong	**Uranidae.**
14	Dorsal vein of primaries furcate toward root	15
	Dorsal vein of primaries not furcate	22
15	Ocelli wanting	16
	Ocelli present	20
16	Costal vein of secondaries arises from subcostal	**Phytometrinae.**
	Costal vein from root, or very near base	17
17	V. 5 of secondaries weak, or wanting	**Dendrometrinae a.**
	V. 5 of secondaries equally strong	18
18	Femora closely scaled	**Dendrometrinae b.**
	Femora with long hair	19
19	V. 6 and 7 of secondaries independent	**Drepanulinae.**
	V. 6 and 7 of secondaries from same stalk	**Notodontina.**
20	Costal vein of secondaries free	21
	V. 8 of secondaries from subcostal	**Nycteolina.**
21	V. 7 of secondaries from subcostal before the end of the cell	**Cymatophorinae.**
	V. 7 of secondaries from end of cell	**Noctuina.**
25	Secondaries with costal vein	23
	Secondaries without costal vein	**Syntomoidea.**
23	Ocelli wanting	**Lithosinae** and **Liparidinae.**
	Ocelli present	**Arctioidea.**
24	Ocelli present	**Micropteryginae.**
25	Secondaries divided into 3 parts	**Pterophorina.**
	Each wing divided into 6 nearly equal feathers	**Alucitina.**

I wish again to call attention to the fact that the preceding table is not exactly accurate, as applied to our fauna, but it is so far correct that all save a few aberrant forms can be correctly referred, by its means. In the next paper will begin the description of the various groups above enumerated.

(To be continued).

Notes on the food-habits of some N. A. Rhynchophora.

BY E. A. SCHWARZ.

Panscopus erinaceus Say, occurred abundantly last July in the mountainous regions of Virginia on wild Grape-vines, feeding on the foliage and young buds.

Eudiagogus. The food-plants of our two species are the Coffee-weeds (*Cassia occidentalis* and *C. obtusifolia*, and probably also other species of this genus). *E. pulcher* is much more abundant and more widely distributed than *Rosenschoeldi* and sometimes defoliates large tracts of these troublesome weeds.

Pachytychius discoideus Lec., breeds in the flower heads of *Hellenium tenuifolium*.

Anthonomus gularis Lec.; oviposits in the blossoms of *Cassia marilandica* in the middle of August, the larvæ developing in the pods of the plant.

Anthonomus flavicornis Boh. I found this inquilinous in a globular Acarid gall on the leaves of *Solanum eleagnifolium* at Columbus, Texas.

Rhyssematus lineaticollis Say. Larvæ and pupæ were found in the seed pods of *Asclepias tuberosa* at Detroit, Mich., toward the end of August. There are usually only two or three, rarely more, larvæ within the same pod, and they destroy only a small portion of the seeds.

Himatium errans Lec., is inquilinous in the galleries of *Tomicus cacographus* under bark of Yellow Pine. It occurred abundantly at Tallahassee, Fla., in April.

Hypothenemus eruditus Westw. (*hispidulus* Lec.), infests not only dry twigs of all sorts of deciduous trees, shrubs and woody plants, but also old cotton bolls, dried up figs, pomegranates and other fruits. In consequence of this diversity in food-habits the beetle exhibits considerable variation in size, shape and sculpture. I have seen specimens from the Bahama Islands, Jamaica and Brazil. Not rarely specimens occur in which the head is protruded and thus apparently not covered by the prothorax. Upon such specimens Mr. Eichhoff seems to have established his genus *Stephanoderes*.

Micracis rudis Lec., bores under the bark of the larger twigs of Hackberry (*Celtis*). It is a rare species and I always found only single specimens. Occurs in Michigan, Texas and Georgia.

Micracis opacicollis Lec. Very abundant at Washington, D. C., in small oak twigs which have been affected by a Cynipidous stem-gall.

There are sometimes more than 50 specimens in a single twig of three or four inches in length. The beetle may be found at all seasons and there are at last three annual generations.

Scolytus muticus, Say. I found this rare species in August under bark of Celtis at Washington, D. C., and at Columbus, Tex. At the latter place it occurred in company with *S. fagi*, Walsh, which is, however, much more abundant and greatly destructive to the Hackberry.

Chramesus Chapuisii, Lec. I obtained this from twigs of the Pecan nut (*Carya olivaeformis*) at Columbus, Tex.

Phlœotribus frontalis, Fabr., breeds in large numbers in small twigs of Hackberry and also bores under the bark of the large limbs of the same tree.

Cnesinus strigicollis, Lec. Cut from dry wigs of a Bumelia at Columbus, Tex. Near Washington, D. C., it is not rarely found on twigs of freshly felled Oak shrubs.

Brachytarsus limbatus, Say. I raised this species abundantly from the flower heads of *Hellenium tenuifolium* at Selma, Ala. From the same plant I obtained *B. vestitus* at Columbus, Tex.

Brachytarsus variegatus, Say; breeds in the smut of corn.

Choragus Sayi, Lec. I cut several specimens near Washington, D. C., from thin, dead beech twigs which were infested with fungus growth.

Euxenus piceus, Lec. This, the smallest of our Rhynchophora, is found abundantly in Florida on dry Palmetto leaves, it larva living, in all probability, in the ribs of the leaf. Several specimens of an undescribed species of *Xenorchestes* were found under the same conditions by Mr. H. G. Hubbard in southeastern Florida.

ABSTRACT of the PROCEEDINGS of the Entomological Club of the A. A. A. S.

The meetings of the Club were very well attended, some thirty gentlemen and ladies having been present; among them some of our best known entomologists. A feature of the meeting was the presence of Dr. Jno. G. Morris well known to all Entomologists as one of the pioneers in American Lepidopterology; to whom we owe our first catalogue, and to whose efforts we owe also the first attempt at systematizing our lepidopterous fauna. It will no doubt be a pleasure to our readers to learn, that Dr. Morris has announced his intention of returning to his first love—Entomology, and we doubt not he will be hailed with sincere pleasure by the new generation of Entomologists who have hitherto known him so favorably by what he has already done.

Sept. 3d. Officers elected. John G. Morris of Baltimore, Presid.; Herbert Osborn of Ames, Ia., Vice-Presid.; John B. Smith of Brooklyn, Secretary.

Dr. Horn called attention to the historical associations connected with the place in which the club then met. On that very spot in the old museum of Natural History, Thomas Say, poor in pocket, though rich in brain, put up his bed under the skeleton of some large mammal, and this for months was his only home. There also be contracted the illness which resulted in his death.

A paper from D. S. Kellicott, "On the ovipositing apparatus of *Nonagria subcarnea*" was read by the Secretary.

The last two abdominal segments of the ♀ are strangely modified. The last is laterally broad, chitinous except at base, terminating in two finger like processes; these are connected at the apices and curve downward. Two concave discs lead to the anal orifice; it is evidently along this channel that the eggs are passed by the ovipositor. On either side, and below the groove is a strong chitinous ridge with saw like teeth, pointed backward. The other modified ring consists of a heavy band with stout posterior processes for muscular attachment; below are two stout chisels pointing backward and overlapping the first basal teeth of the "saws" of the last ring.

The eggs are laid near the edge of the leaf in a row, and the leaf is then bent over the eggs, carefully cemented down, and a perfect tube thus formed. The manner in which this is done has not been witnessed.

The imago has a very peculiar and very prominent pointed clypeal projection, of use probably in enabling it to pierce the stems of the *Typha* in which it lives during the arval period and undergoes its transformation.

Mr. Smith cited the presence of similar modifications in other groups of the Noctuidæ.

Mr. John B. Smith exhibited six large photographic plates of *Agrotis* and gave a review of the remarkable range of variation in structure found in the genus. Much greater than in many recognized genera.

In response to a question from Dr. Morris, Mr. Smith said that in the *Noctuidae* genera were undoubtedly based upon very thin characters—less so than in *Coleoptera* however.

Dr. Horn said it was long since laid down by Lacordaire that characters of scarcely specific value in one group formed excellent bases for high divisions in others; genera have no existence in nature and are created only for convenience in dividing up large masses of species to facilitate recognition. Nature has species only. Of late however, persons afflicted with the *mihi* itch, finding new species scarce had taken to describing genera. For 12,000 species of *Coleoptera* some 2000 genera had been described.

Dr. McCook says in the spiders and ants there is plenty of room for persons with the *mihi* itch, as there is a very large mass of undescribed material.

Mr. B. P. Mann then proposed a combination of the Entomological journals of America to be published by a stock company and to combine the good features of each. This proposition provoked much discussion and while the general sentiment was in favor of such a publication the opinions also went generally to the point that it would be still less likely to pay than those now existing. The Am. Entom. Soc. is wealthy enough to publish everything in the way of long systematic papers presented to it, and the "Transactions" would be the natural avenue for such works. The Bull. Bkln. Ent. Soc. covered another ground in the way of reducing to its simplest and most comprehensive form the knowledge of Coleoptera and Lepidoptera: often as, Dr. Horn stated, publishing the result of two weeks hard work, on less than two pages. It was also published and supported by a Society willing and able to support it. The Can. Ent. was supported by govt aid. "Papilio" was established merely to enable certain authors to get into print more rapidly than they could otherwise do. and its editor announced that he saw no reason for its continued existence.

"Psyche" has a hard struggle for existence, but will not suspend just yet.

A committee was appointed to consider whether such a combination was advisable, and whether and how it could be supported.

This committee afterward reported adversely to any such scheme.

Prof. Fernald then proposed a series of very interesting questions provoking considerable discussion, and on these questions he would like the opinion of all who may have considered them.

1. Where a name has once been published by an author, shall we change the mode of spelling to one more consistent with its derivation; e.g: Treitschke writes *Cochylis*, probably by mistake; shall we adopt his spelling or the more correct *Conchylis?*

Dr. Horn says no; some authors merely put together a lot of letters without any meaning whatever and called them genera. If such barbarisms were accepted we should not stir a name as originally spelled by the author. Mr. Mann agreed with Dr. Horn. Dr McCook thought we might make the change; but not if thereby the author's right to priority would be destroyed.

2. Where an author publishes a name manifestly incorrect in orthography, and in a later work corrects his own error, shall we adopt his correction?

The sentiment was that when the correction was made within a reasonable time and before the incorrect form had come into general use, it should be adopted.

3. Should the termination of the specific name be made to agree with the generic in gender? e.g. Zeller writes *Tortrix viridana*; *Exartema permundanum*; *Lophoderus ministranus.* Shall this rule be adopted, or shall we adopt the ending in *ana* irrespective of the gender of the genus?

Dr. Horn says in Coleoptera specific and generic names always agree in gender; where however a termination means something, i.e. indicates the family to which an insect belongs, he would use the uniform terminations. Mr. Mann does not believe in uniform terminations and while he would not change existing names, neither would be consider himself bound to uniform terminations in proposing new ones.

4. Where a *Tortricid* species is described with a name not ending in *ana* should this be changed to *ana?* e.g. *Carpocapsa pomonella?* Prof. Fernald himself was adverse to such change, and no one disagreed with him.

5. To what extent should the law of priority be made use of? Shall we make use of the oldest name even if the species has been known under another for a long time? If not, for how long a time must a name universally or generally be in use to take precedence over an older name?

The sentiment of the meeting was that discussion of his question would be useless, as no conclusion even if reached would be respected.

6. What should be taken as the starting point in nomenclature; some have taken the 12th edition of Lin. Syst. Nat. while others have taken the 10th edition?

No decided opinions were elicited though preferences were stated.

Prof. Fernald expressed surprise that Hübner's Verzeichniss genera should be so generally ignored, though they were after a fashion described, while Guenee's genera of micros proposed in the Index methodicus, though not sanctioned by one word of description were universally adopted.

Dr. Horn thought the case might be parallel to that of Erichson and Motschulsky both of whom had proposed some generic terms and had not described them; but while Erichson's genera were all adopted because they always were well founded, Motschulsky's were as uniformly ignored because usually unfounded.

Mr. Smith said as to *Noctuidae* the parallel would hold. Prof. Fernald said, not so of *Tortricidae*; Guenee has just as many baseless genera as Hübner has,

Sept. 4th —On this occasion the meeting was held at the Ac. of N. Sc. in the rooms of the Am Ent. Soc. Mr. J. H. Emerton exhibited a large number of his types of spiders recently described by him. and the collections of the Society were open.

Mr. Smith gave an account of the secondary sexual characters of some Lepidoptera, notably *Noctuidae* and *Deltoidae*, illustrated by blackboard sketches. In the *Deltoids* these characters are most aberrant; in the *Herminiinae* the anterior coxa is slender, much elongated, the femur a mere shell, furnished with a dense tuft of long hair; the tibia is more or less aborted, and modified into a flattened plate, also furnished with a large tuft. The first tarsal joint which is usually mistaken for the tibia is greatly elongated and is inserted into the tibia near to the base. In *Palthis* the tibia is very short, and the tarsi developed to an enormous extent. In addition the ♂ *Palthis* has a very long tuft of hair on the terminal joint of palpi. Various antennal peculiarities were noted. *Renia* has a strongly bent joint at basal third, from the base of which proceeds an articulated appendage fringed with hair *Zanclognatha* has a different bend and lacks the articulated appendage. The modification in the ♂ of *Heliothis paradoxus* and other forms with pellucid spots on primaries was discussed, and the questions raised: what purpose do they serve? what value shall they have in classification?

Prof. Fernald says, in the *Tortricidae*, generic and even higher value had been accorded these characters. A prominent one in this family was the costal fold which sometimes extends two-thirds across the wing.

Dr. Horn says both sexes must be considered in characterizing a species; a species consists of two separate individuals which must be studied as one: synoptic work has a higher aim than the mere recognition of species.

Dr. Macloskie called attention to some sexual differences in birds; the flickers of the East and West were widely different: in intermediate points intermediate forms were found and the ♀s were almost indistinguishable. Yet they were distinct, and though no anatomical differences could be found there must be a physiological difference.

Mr. Osborn read a paper on *Mallophaga* and *Pediculidae**, calling attention to the correspondence of identical or very similar species on the closely related birds and mammals of Europe and America, citing a large number of instances.

Miss Cora H. Clarke gave an account of the habits of some Caddis fly larvæ belonging to *Hydropsyche* and *Plectrocnemia*, exhibiting specimens of their work.

Mr. Mann explained how Prof. Barnard raised larva living in running water; he confined them in a glass tube, one end closed by a porous substance, the other fastened to a faucet. In this way a steady flow of water of any desired strength can be kept up.

Dr. Morris exhibited a gall recently collected and asked information concerning its identity. Asked also what orders of insects are known to produce galls. Mr. Osborn said about all orders except *Orthoptera* and *Neuroptera*. Mr. Smith said at last one American *Apionid* was known as a true gall producer, while several European species formed root galls.

Mr. Mann said in Bibliographical work he had found great difficulty in indexing galls; he had among others indexed them under descriptive botany.

Mr. Osborn said while many plants, especially the *Rosacea* were subject to galls yet they were produced by insects and are abnormal so far as the plants are concerned; almost every species of insect produces a peculiar gall of its own.

---

* Families of parasitic *Hemiptera* which infest man and some of the lower animals.

Dr. Hoy said galls were pathological appearances and rather diseases of plants; as much out of place in descriptive botany as a description of cancer in a description of the lips.

Dr. Morris remarked on the scarcity of larva and imagines of Lepidoptera, which produced much discussion, and showed that while northward there had been no unusual dearth of insects, elsewhere all insects had been remarkably rare. *Cardui* was an exception and generally common. Mr. Aaron cited a remark of Mr. Ridings that he was always afraid of a season when *cardui* was abundant, for then, usually, nothing else would be found.

Dr. Hoy remarked that in his locality (Racine, Wisc.) he had found many insects usually more southern, and started a discussion upon the range of *P. turnus.*

The question then turned upon the food plants of *P. ajax*. Dr. Hoy said the pawpaw was not found within 200 miles of Racine, while *ajax* had often been found, still fresh and not fully developed.

Mr. Aaron gave spice wood and upland huckleberry as further food plants. Dr. Hoy said they had the huckleberry but not the spice bush.

Mr. Osborn had seen *ajax* but knew of neither huckleberry, pawpaw or spice bush in the vicinity of Ames, Ia., of the spice wood he was not sure—they might have it. He reports from Sioux City, that there *Chrysochus auratus* is so common, that it is crushed under foot in the streets. Mr. Mann has seen them in woods in piles upon stones.

Mr. Saunders reports an abundance of *H. textor* everywhere through Canada, and from West Canada an invasion of the larva of *Grapta progne* on currants.

Mr. Græf exhibited some specimens of Lepidoptera, rare or typical of recently described forms.

Sept. 8th.—Prof. Martin exhibited some specimens of gum copal containing imbedded insects, all of which appeared to be of a post tertiary type. The gum is obtained near the equator, some distance from the shore, by digging at the site of old forests, long since extinct, the gum being the product of such trees. Among the Coleoptera Dr. Horn recognized a form allied to *Callida*, 2 *Chrysomelids*, 1 *Clerus*, 1 *Cymatodera*, 2 *Longicorns* near *Clytus* and *Leptura* and an Elaterid much like one of our species of *Cardiophorus*. Mr. Smith recognized one of the *Lepidoptera* as a *Mamestra*, and the *Hemiptera* as representing common living types, one Homopterous species remarkably like a form now common and in the *Diptera* a common *Muscid* type.

Prof. Lintner gave the results of some observations on injurious insects. *Orgyia leucostigma* was very rare in Albany. Mr. Dimmock found the same in Boston. Mr. Hulst the same on L. I. and Mr. Smith the exact contrary at Cape Cod, Mass.

From Michigan the larva of *Agrotis fennica* is reported as so abundant that it is called the black army worm. Usually this is a rare insect. *Podisus cynica* has been observed destroying the currant worm in numbers. *Lygus linearis* is injurious to green peas, stinging and blotching them. *Poecilocapsus lineatus* has seriously injured gooseberries, stinging the branches and thus causing their death.

Phytonomus punctatus has spread westward and attacked beans; a new habit for this insect. *Crioceris asparagi* has moved west as far as Geneva, N. J.; heretofore it has been confined to the coast districts. *Galerucella xanthomelaena* has been very destructive to elms. A vast number of specimens of *Otiorhynchus ligneus* were found in a house which had been closed for four years What had they fed on? There was nothing in the house, and one of the natural articles of food is the strawberry root.

A curious seed, (*Euphorbia*, probably) from Mexico was exhibited, locally known as the "jumping seeds". The peculiarity consists of a series of erratic movements and leaps made by the apparently perfect seed. They contain however a larva of *Carpocapsa saltitans*, and it is the motions of this insect which cause the movements of the seeds; why they make these motions is unknown. The species closely resembles *C. pomonella* but has very differently formed legs the tarsi being hidden by long scaly tufts.

Dr. Horn calls attention to the fact that all the injurious Coleoptera cited by Mr. Lintner were imported species and that the fact of their motion westward along the line of their food plant was to be expected. *Crioceris 12 punctata*, also an imported species, has been taken near Baltimore; near that city, and Alexandria many imported species are found. *Blaps mortisiga* and one other species are common; the former can be taken in some places by the bushel. Curious is the remarkable increase of some species. In 1874 when working with Dr. Leconte on the *Rhynchophora* among all their material only a single specimen of *Aramiges Fulleri* was contained and that came from Montana. A year or two after, it was received from all parts of the country aud was dreaded as one of the worst hot house pests. How did this species spread so suddenly over so large a territory? Prof. Lintner had first found the insect in 1876. Mr. Dimmock finds it very troublesome in hot houses, particularly on roses.

Mr. Hulst noted the appearance in large numbers of a downy insect on maple. Mr. Lintner said it was *Coccus* (*Pulvinaria*) *innumerabilis*. Prof. Osborn had noticed the same insect, and gave its life history: no less than seven species of insects are known to prey on it. Mr. Saunders has noticed it, and the larva of *Chilocorus bivulnerus* had also been so common as to attract attention and cause alarm. Mr. Underwood reports that the species is said occasionally to attack the elm.

Dr. Horn gave an account of secondary sexual characters of coleoptera comparative with Mr. Smith's account of Lepidoptera. In *Collops* the antennal modification is very like that of *Renia*, and the use of it has been observed: the ♀ antenna is grasped in the bend of that of the ♂; the articulated appendage is thrown forward, and the antenna beyond the bent joint is thrown backward, so that during copulation the ♀ is firmly held. In *Meloe* is a structure very similar to that of *Herminia* and answering a similar purpose. The palpi in *Sphalera* (*Tomoxia*) sometimes have an articulated appendage near tip, probably also serving as a grasping organ. These organs are explainable. Other modifications are obscure. *Lebia* for instance has a notch at the inner side of the middle tibia near tip: a species of *Aphodius* has a very curious hook to the first joint of hind tarsi: another has a peculiar clavate appendage to the inner side of fore tibia near tip.

Mr. Cresson says, that except in the parasitic forms which he has not studied, the Hymenoptera show no such peculiarities.

Mr. Osborn says that in *Mallophagidæ*, and especially in *Lipeurus*, a modification of the antenna similar to that of the *Tomoxia* palpi was found, and also undoubtedly served as a clasping organ.

A committee of three was appointed to arrange a programme and obtain papers for the next meeting of the club, which then adjourned. Committee; J. B. Smith, of Brooklyn, Chairman, and B. Pickman Mann, of Washington, and Herbert Osborn, of Ames, Iowa.

JOHN B. SMITH, Secretary.

ON PRESERVING LARVAE.

BY A. W. PUTMAN CRAMER.

Though a person may have collected and studied Lepidoptera for years and though he may be able to determine hundreds of imagines from memory, still he will in all probability be unable to give the names of more than a few dozen larvæ, and will find himself utterly at sea when endeavoring to describe any larva from memory in such a way that it can be recognized. Even carefully written descriptions of larvæ, made from the living insect give no satisfaction at all when not accompanied by a drawing.

Some of us have made sketches or drawings of rare larvæ, but this takes up too much valuable time and few collectors can draw a recognizable picture. Others have tried to preserve the larvæ as near life-like as possible and have met with more or less success.

In the present article I have tried to describe a method which has given me during the past year much satisfaction both on account of its simplicity and effectiveness; the colors remaining nearly unchanged. It requires no costly or bulky apparatus and a little practice will enable any one to preserve his larvæ in their natural shape and color. As a rule larvæ are in the best condition to be operated upon, from three to six days after moulting. The colors are then not so easily destroyed as they are shortly after moulting or closely before pupation

When collecting caterpillars for this purpose do not crowd them together in one box as they will invariably stain each other with their green saliva, causing dark spots on the skin, which I have thus far been unable to remove.

The best way of killing them is with cyanide, care being taken that the cyanide-bottle is perfectly dry and that the exudation of the larva when dying does not come in contact with the skin.

When dead, place the larva on a piece of paper resting on some soft material like wool, take a glass rod or tube, covered with rubber and cause the contents of the intestines to pass out through the anus by pressing the covered rod on the larva and rolling it from the middle of its back towards the claspers. While doing this the intestine will protrude to a length varying according to the size of the insect from 5 to 15 millimeters. Next place the rod close behind the head and repeat the operation, but do not endeavor to remove everything nor to exert much pressure on the larva or your green caterpillar, if you are operating on such a one, will lose its color and turn either white, yellow or brown.

Having removed the necessary part of the contents of the intestines, take the protruding alimentary canal between your fingers and insert the point of a finely drawn out glass tube, till it enters the anus two or three millimeters, then secure the intestine to the tube with a thread and make the juncture air-tight with a little collodion. All that now remains to be done is to fill the larva with air under a pressure of from 5 to 15 millimeters of water according to the size of the larva and then to let it dry. The drying process will generally take from one to six days.

The advantages of this process are that you need no oven or heat, that the colors do not change, that the operation takes but a few minutes and that you have great facilities to give the larva a natural position.

After the larvæ are dry they are easily removed from the tube by cutting the intestine close to the anus all around the tube. By rubbing a little soap on the point of the tube before insertion it prevents the membrane sticking to the tube. When it is merely desired to dry one or two larvæ the air pressure is most readily obtained from those red rubber balloons which are sold in all toy-stores. By fastening a short glass tube provided with a rubber tube and pinchcock in the mouth of the balloon and inflating it with air, closing the pinchcock, then attaching it to the glass tube which has been secured to the larva and opening the pinchcock the larva skin will inflate and take a more or less natural form. I generally have the drying larvæ lie on a table, and cause them to take a natural position, by propping them up or holding them down wherever desired; by hanging them up they are apt to elongate too much.

Where it is desired to dry several larvæ a small gas holder can be used advantageously, though the following apparatus is as satisfactory as to results and can be readily obtained. A U-shaped tube made of tin or iron tubing from 7 to 10 centimeters in diameter, the legs being each about 60 centimeters long, is open at one end and connects at the other to a series of small T-shaped tubes of about 4 millimeters bore, each ending in a short piece of rubber tubing closed with a pinchcock or glass stopper. By pouring water in the open leg the air is compressed in the closed one and any desired pressure of air can be obtained, while larvæ can be attached or detached without the least trouble or any appreciable loss of pressure.

SYNOPSES OF COLEOPTERA.

TETROPIUM, *Kirby.*

This genus contains two species resembling *Asemum* in general appearance but differing from it in the unequal palpi and divided eyes.

T. velutinum, Lec. Ann. Lyc. Nat. Hist. IV, 1869, 7. 382.

This species may be known by the somewhat opaque thorax with deep medial impression and strongly rounded sides, and by the fine velvety pubescence which covers the thorax and elytra. The latter are described by Dr. Leconte as being "sometimes piceo-ferruginous at base" but in specimens under examination are of a uniform reddish brown. Length .50 to .80 inches, = 12½ to 20 mm. Habitat, Vanc., Cal., Montana.

T. cinnamopterum, Kirby. Fn. Bor. Am. IV, p. 174, t. 5, f. 8. Lec. J.A,P., ser. 2. II, 1850. p. 35.

In this species the disk of thorax is more shining, smoother and less broadly rounded at sides; and the pubescence is less marked. The elytra are dark slatey brown in color, varying to reddish brown and bear two more or less marked costæ. Length .50 inch. = 12.5 mm Hab. N. J., Pa., abundant Lake Superior.

OPSIMUS, *Mann.*

This genus contains one species which with *Dicentrus* constitutes the group *Opsimi* distinguished from all other groups by having the thickened hind margin of the prothorax broadly emarginate in the arc of a circle and the emargination filled with a thin corneous plate. The species is

O. quadrilineatus, Mann. Bull. Mosc. 1843, II, p. 305; Esch. Dej. Cat. 3d ed. p. 354; Lec. Ent. Rep. 1857, p. 60, t. 2, f. 10.

It is a dead-colored, finely pubescent insect, having the prothorax armed with a lateral acute spine, and the disk of the elytra with several vague impressions. The palpi are unequal in length and the legs stout with strongly clavate thighs and the 1st joint of hind tarsi longer than the two following united. Length .31 to .35 inch. = 8—9 mm. Hab. Alaska, Or.

DICENTRUS, *Lec.*

In this genus the thighs are not clavate and the prothorax is armed at sides with an acute spine at base in addition to the lateral spines. The species is

D. Bluethneri, Lec. Trans. Am. Ent. Soc. VIII, p. 195.

The color of this species is piceous, and the elytra have each two large brown spots. Length .12 to .22 inch. = 3 to 5.5 mm. Habitat, California.

SMODICUM, *Lec,*

It seems useless to repeat all the group characteristics of this genus. They are fully stated in the "Classification'. The single species is easily recognized by its narrow, depressed form and shining, pale yellow color. Length .3 inch. = 7.5 mm. Hab. Atlantic States to Texas.

S. cucujiforme, Say. J.A.P. V, 3, 1827, p. 277. Lec. J.A.P. ser. 2, II, 1850, p. 24; *cylindrides* Newm. Ent. Mag. V, p. 394; *melanophthalmum* Dej. Cat. 3d ed. p. 357.

CONOCALLUS, *Lec.*

This genus contains only one species:

C. collaris, Kirby. Fn. Bor. Am. IV, 1837, p. 141; Lec. J.A.P. ser. 2, II. p. 33; *lepidum* Lec. J.A.P., ser. 2, II, 1850, p. 34.

It is a slender black species with bright red prothorax and brassy elytra. The thighs are comparatively slender and the 11th joint of the antennæ in ♂ is distinctly divided, the outer portion the shorter. Length .35 inch. = 9 mm. Hab. Canada, Lake Superior.

PHYSOCNEMUM, *Lec.*

This genus is equivalent to *Dularius* Thoms. of the Crotch Check List, over which it has priority. It contains two species which have strongly clavate femora, and the elytra with humeral angles rectangular and raised lines of a pale color approaching the appearance of ivory. The species are

P. Andreae, Hald. Trans. Am. Phil. X, 1847, p. 36; Lec. J.A.P. ser. 2, II, p. 32; Dej. Cat. 3d ed. p. 355; *luscum*, Thoms. Class. Long. p. 257.

In this species the elytra are blackish, more or less red at base and apex and the ivory lines form a St. Andrews' cross. The femora are tawny in color. Length .80 inch. = 20 mm. Hab. Georgia, rare.

P. brevilineus, Say, J.A.P. III, 1823, p. 413; Hald. Trans. Am. Phil. X, p. 38; Thoms. Class. Long. p. 358; *chalybeum* Dej. Cat. 3d ed. p. 355.

The elytra are bluish black and shining, the femora are black and the ivory lines irregularly disposed. Length .50 to .75 inch. = 12.5 to 19 mm. Hab. Pa. to Kansas.

RHOPALOPUS, *Muls.*

This genus contains only one species resembling the preceding in form but differing from it by the absence of the ivory lines. It is entirely black except the thorax which is bright red and the tips of the elytra which are brownish. The thorax is obtusely angulated at sides and finely granulate as is the entire body. The legs are black and pilose with femora moderately strongly clavate. Length ⅝ to ¾ inch. = 15 to 19 mm. Hab. Northern New York.

R. sanguinicollis, Horn, Proc. Ac. Nat. Sci. Phil. 1860, XII, p. 571, t. 8, f. 3.

HYLOTRUPES, *Serv.*

This genus includes three species which resemble *Phymatodes* in the rounded sides of prothorax, slightly tapering elytra and clavate femora but differing in the broad prosternum and enclosed hind coxæ. They are easily separated by their colors as follows.

Black, elytra black with grey pubescence	**bajulus.**
Black, elytra violet blue	**amethystinus.**
Black, elytra yellow or red with black markings	**ligneus.**

H. bajulus, Linn. Syst. Nat. ed. X, p. 396; Panz. Fn. Germ. 70, 1; &c. *caudatus* Dels.; *Linneianus* Laich; *similis* Marsh; *bullatus* Hald. Trans. Am. Phil. X, p. 36; Lec. J.A.P. ser. 2, II, p. 31; *imperfectus* Falderm; *lividus* Muls; &c.

This species is entirely black, the thorax thickly clothed with long white hair and ornamented with two smooth, strongly elevated callosities. The elytra are black, coriaceous at tip and sides and have an indistinct patch of white or gray pubescence about one-third from base with sometimes a still more indistinct patch behind this. The posterior thighs are scarcely clavate. The antennæ are very slender and short; in ♂ one-third, in ♀ one-half length of body. Length ¾ to ⅞ inch. = 19 to 23 mm. Hab. United States.

H. amethystinus, Lec. Proc. Ac. Phil. VI, p. 234.

This species is black, the thorax has three indistinct smooth longitudinal elevations, and is otherwise densely punctured; the elytra are shining violet blue, finely and densely punctured; the femora are simple, neither anterior nor posterior being clavate. Length .75 inch. = 19 mm. Hab. California.

H. ligneus, Fab. Mant. Ins. I, p. 153; Oliv. Ent. IV, 70, p. 23, t. 7, f. 79; Lec. J.A.P. ser. 2, II, p. 32.

This species is very variable in color. The body is black and the thorax carries five slightly elevated callosities. The thighs are as in *bajulus* clavate except the posterior. The antennæ are longer and in the female quite strongly serrate. The normal color of the elytra is bright yellow with apical fourth and a medial spot black. The yellow is at times however nearly red and the spot is extremely variable in size and shape. Length .30 to .45 inch. = 7 to 12 mm. Habitat, Maine to California.

PHYMATODES, *Muls.*

This genus, containing many species, in addition to characters of table is distinguished from *Callidium* which the species often closely resemble, by the labial palpi being much shorter than the maxillary. The type of the genus is *variabilis* which is so well known than an extended description is unnecessary. With the assistance of Dr. Horn we have compiled the following table:

SYNOPSIS OF PHYMATODES.

- Thorax yellowish, surface metallic.
  - Larger species.
    - Thorax, elytra and legs yellow, more or less marked with blue ...... **variabilis.**
    - Color fuscous .... **infuscatus.**
  - Smaller species.
    - Elytra piceous .... **thoracicus.**
    - Elytra blue.
      - Antennæ all dark .... **amoenus.**
      - Basal joint of antennæ pale .... **blandus.**
- Thorax rufous with broad black vitta .... **maculicollis.**
- Thorax and elytra unicolorous.
  - Brown or bluish black, larger species .... **obscurus.**
  - Opaque brown or black, smaller species .... **ater.**
  - Shining black .... **aeneus.**
- Thorax dark, elytra of lighter shade before the middle .... **dimidiatus.**
- Thorax variable, elytra fasciate.
  - Elytra with one fascia .... **vulneratus.**
  - Elytra opaque with two fasciæ.
    - Fasciæ transverse .... **varius.**
    - Fasciæ oblique .... **decussatus.**
  - Elytra very shining, with two fasciæ .... **nitidus.**

P. variabilis, Linn. Fr. Suec. p. 192; Kb, Fn. Bor. Am. IV, p. 172; Costa, Fn. di Nap. II. p. 33, t. 33, f. 1—4; *testaceum* Linn. Syst. Nat. ed. X, p. 396; Oliv. Ent. IV, 79, p. 15, t. 1, f. 11; Schoenh. Syn. Ins. I, 3, p. 443; Muls. Col, Fr. ed. I, p. 50; *ventrale* Hald. Trans. Am. Phil. X, p. 37.

The coloring of this species varies greatly, it being sometimes entirely yellowish and sometimes entirely suffused with a metallic blue which reaches the thorax and tibiæ. Every variety between these extremes is found. Length .52 inch. = 13 mm. Hab. United States.

P. infuscatus, Lec. Proc. Ac. Phil. 1859, p. 285.

This is, *fide* Dr. Horn, almost surely a synonym of *variabilis*.

P. thoracicus, Muls. Col. Fr. ed. I, p. 51.

The thorax varies in color somewhat, being yellowish testaceous with more or less darker blotches at sides. The elytra are uniformly piceous, in specimens before us with a faint metallic lustre. The ♂ antennæ are very long and filiform. Length .36 inch. = 9 mm. Hab. Canada and M. States. The species is an imported one.

P. amoenus, Say, J.A.P. III, 1823, p. 413; Lec. J.A.P. ser. 2, II, p. 33; *bicolor* Knoch. i. *litt.*

The thorax is bright yellow and the elytra metallic blue. Length .20 to .32 inch. = 5 to 8 mm. Hab. New York.

P. blandus, Lec. Proc. Ac. Phil. 1859, p. 79.

Resembles the preceding very closely, but the elytra vary to a lighter shade of blue and the basal joint of antennæ is always pale. It is also narrower than *amoenus*. Length .30 inch. = 7.5 mm. Hab. California.

P. maculicollis, Lec. Proc. Am. Phil. XVII, p. 614.

No specimens of this species are before us. We give therefore Dr. Leconte s description in full.

"Blackish, piceous, finely sparsely pubescent. Head and prothorax finely not densely punctured, the latter a little wider than long, rounded at the sides, rufous with a broad black dorsal vitta. Elytra not wider than the prothorax, densely punctured. Beneath sparsely punctulate, prothorax rufous, legs piceous, coxæ and thighs except at base blackish. Front coxæ contiguous, mesosternum triangular, middle coxæ slightly separated. Antennæ slender, filiform, a little more than one-half as long as the body, 4th joint equal to 5th. Length .25 inch. = 6.5 mm. Hab. Isle Royale, Lake Superior; but one specimen found."

P. obscurus, Lec. Proc. Ac. Phil. 1859, p. 79.

This species presents a slightly different form, the humeral angles being quite prominent and showing traces of a tubercle. The color varies from quite a light brown to a deep bluish black. Length .38 to .58 inch. = 9.5 to 15 mm. Hab. California.

P. ater, Lec. Mss.

The description of this heretofore unpublished species has been given us by Dr. Horn from the manuscript of the late Dr. Leconte.

Black, very sparsely and finely pubescent, head punctured; prothorax half wider than long, strongly punctured, much rounded at the sides; elytra strongly and equally punctured; antennæ and legs tinged with piceous. Length .25 inch. = 6.5 mm. Hab. Buffalo. N. Y.; one ♂.

P. aeneus, Lec. Proc. Ac. Phil. VII, 1854, p. 18; Entom. Rept. 1857, p. 60.

This very distinct species is of a uniform shining black color. Length .27 to .35 inch. = 7 to 9 mm. Hab. Oregon.

P. dimidiatus, Kb. Fn. Bor. Am. IV, p. 173; Lec. J.A.P. ser. 2, II, p. 33; *anticum* Dej. Cat. 3d ed. p. 355; *palliatum* Hald. Trans. Am. Phil. X, p. 41; *Kalmi* Schoenh. Syn. Ins. I, 3, p. 442; *bajulus* Linn. Mus. Lud. Ul., p. 76; *Mannerheimi* Lec. Ent. Rept. 1857, p. 60.

This species varies in the lighter or darker shade of its color but can always be recognized by the character given. Length .35 to .50 inch. = 9 to 12.5 mm. Hab. United States.

P. vulneratus. Lec. Ent. Rept. Expl. and Surv. XII, 1857, p. 60.

Color uniform black, somewhat shining, with an oblique band of white hair on each elytron. Length .32 inch. = 8 mm. Hab. Cal.

P. varius, Fab. Spec. Ins. I, p. 241; Oliv. Ent. IX, 70, p. 54, t. 5, f. 55; Lec. J.A.P. ser. 2, II, p. 33; *versicolor* Gmel. et Linn. I, 4, p. 1852; *bicinctum* Dej. Cat. 3d ed. p. 355; *albofasciatus* Proc. Ent. Soc. Phil. I, 1862, p. 274.

The coloring of this species varies greatly. It is generally light rufous, darker behind the middle with two transverse white bands, but the species is found of many darker shades and even entirely black with only the extreme base of the elytra a shade lighter. The anterior band is arcuate, the posterior quite straight. Length .25 to .36 inch. = 6 to 9 mm. Hab. United States.

P. decussatus, Lec. Ent. Rept, XII, 1857, p 61.

Varies in color as the preceeding does, but is easily distinguished by the bands being oblique. The anterior is slightly arcuate and bent downward toward the suture, the posterior in the opposite direction. Length .25 to .30 inch. = 6 to 7.5 mm. Hab. California.

P. nitidus. Lec. Trans. Am. Ent. Soc. V, p. 66.

The color of this species varies from yellowish brown to black but the elytra are always lighter before the middle. The bands are as in *decussatus* and the species can only be surely distinguished by the very shining surface of the thorax and elytra. Length .25 to .28 inch. = 6 to 7 mm. Hab. Nevada,

MERIUM, *Kirby.*

Contains only one species:

M. proteus, Kirby. Fn. Bor. Am. IV, 1837, p. 172, t. 5, f. 5; Mann. Bull. Mosc. 1853, III, p. 247; Lec. J.A.P. ser. 2, II, p. 32.

This species is very distinct by the raised lines of the thorax and elytra. The color is brown and the lines being a lighter tint and quite shining resemble dirty ivory. Length .45 to .60 inch. = 11 to 15 mm. Hab. Colorado, Hudson Bay Terr.

SYNOPSES OF BUTTERFLIES.

By Rev. Geo. D. Hulst.

COENONYMPHA, *Hub.*

1. **California,** Doub. Hew. Gen. Diur. Lep, II, p. 398, pl. 67.

Wings above almost uniform dusky white, showing however quite plainly the markings of the under side. Sometimes these exist on the upper side, making on both wings a broad marginal band, slightly lighter in color. There is often a small round more or less obsolete ocellus near the apex, and several in a submarginal row on the hind wings.

Beneath, gray brown with the outer third and inner margin lighter on the primaries; this outer band is lightest towards the base, and at margin contrasts strongly with the gray brown of the base. The secondaries correspond with the primaries, but with outer margin somewhat darker. The primaries generally have one ocellus, the secondaries several, all more or less obsolete. Expands about 1.5 inches. Hab. Pacific Coast.

Var. *a.* **Brenda,** W. H. Edw. Trans. Am. Ent. Soc. 2, 375. *Eryngii,* Hy. Edw.

Light cream white above. Beneath, with central dark edging distinctly marked, often pinkish. Sometimes without ocelli. Cal.

Var. *b.* **galactina,** Bois. Ann. Soc. Ent. Fr. 2me, ser. X, p. 309; *Ceres,* Butl.

Wings above light cream white with lines fainter and base blackish. California.

Var. *c.* **Kodiak,** W. H. Edw. Tr. Am. Ent. Soc. 2, 375.

Wings above light brown with a gray shade. Beneath, the central light shade, white. Kodiak.

Var. *d.* **Pulla,** Hy. Edw. Pap. 1, 51.

Entirely dark fawn color above with blackish at base of wings. Beneath, dull brown with markings indistinct. Cal.

2. **inornata,** W. H. Edw. Proc. Acad. Sci. Phil. 1861, 163.

Wings above, ochrey brown, lighter on disc. Costal margin of primaries and abdominal margin of secondaries grayish. No spots above or below.

Beneath, same color as above from base to beyond middle, then a transverse cinereous ray of lighter color, and beyond this grayish. Sometimes the ray disappears. Secondaries gray, with a slight greenish tinge, darkest from base to middle, and this shade separated from the paler margin by a transverse tortuous interrupted ray, the course of which is parallel with the outer margin. Expands about 1.5 inches. Manitoba, Newfoundland.

Var. *a.* **ochracea,** W. H. Edw. Proc. Acad. Sci. Phil. 1861, 163.

Bright glossy ochrey yellow above without any mark or spot, except as marks below show through; base of wings dark gray. Beneath, primaries the same color but grayish along outer and abdominal margin; a submarginal row of several obsolete ocelli; White rays as in *inornata.* Rocky Mts. and Pacific Coast.

Var. *b.* **Ampelos,** W. H. Edw. Trans. Am. Ent. Soc. 3, 213.

Above bright glossy ochreous; beneath nearly the same. Rays as in *inornata.* No ocelli above or below. Oregon.

Var. **Elko**, W. H. Edw. Can. Ent. 13, 57.

Upper side more yellow than *Ampelos*. Underside much lighter; the basal and outer parts contrasting in color. Nevada.

3. **Pamphila**, Linn. Syst. Nat. Ed. X, 472. *Pamphiloides*, Reak.

Upper side almost uniform ochrey yellow; all wings edged outwardly with brown more or less dark. A single ocellus more or less obsolete near apex of primaries. Costa of primaries dark.

Beneath, primaries as above, ocellus somewhat brighter. Secondaries brown darkest towards base, somewhat reddish outwardly; outer third lighter. Near the middle is an irregular ray, well marked, much lighter, extending from anterior margin half way across the wing. Expands 1 to 1.25 inches. Rocky Mts.

The above is our determination of the species of this genus with the material we have at hand. The species are very variable, and even Mr. Butler, who is known as a multiplier of species on superficial differences says (Cat. Satyr Brit. Mus.): "the form of the local bands, and the constancy of the ocelli can not be relied on in *Coenonympha*". We may add, nor can the shade of the general color above and below. The forms placed as variations of *California* and *inornata* do not all we think deserve that distinction. *Inornata* itself is probably not more than a variety, if it be not a synonym of *C. Tiphon*, Rott, but we have not the material on hand to make the statement positively.

With regard to *pamphiloides* Mr. Strecker has Reakirts type, and says it differs in no way from *pamphila*.

SOCIETY NEWS.

Sept. 27th.--The Society met for the first time at its new rooms in the Brooklyn Polytechnic Institute. Prof. Mayer in the chair, 18 members present.

Mr. M. C. Linel was elected a member of the Society, and Messrs. J. Mohns, F. A. Stinner and S. P. Sammis were proposed for membership by Mr. Gade.

It was resolved to convey to the authorities of the Polytechnic Institute the thanks of the Society for the accomodations furnished.

An invitation was also extended to all connected with the Institute to attend the meetings of the Society.

Messrs. Weeks and Cramer were appointed a committee to report upon the feasibility of a series of short lectures on Entomology to be given by specialists, members of the Society.

Mr. Geo. Gade gave the results of some observations on the habits of *Pimpla* (*Rhyssa*) *lunator* usually classed as an ichneumon. The males are often observed congregated upon an apparently sound part of a tree; scraping away bark, sometimes to the depth of ½ inch, the ♀ was found ready to emerge. Retiring, the males at once returned and one finally succeeded in copulating with the ♀

while yet she was in the cell or burrow. They remain but a short time *in copula*, then the ♀ completes her exit from the larval habitation, and flies about, further unmolested by the ♂, in search of a suitable tree upon which to oviposit. One found, she explores all crevices with her antennæ and a satisfactory spot found—often a hole left by a *Pimpla* in emerging—she deposits an egg, which is very small, smooth, oval, and yellowish brown in color.

The oviposition is performed as follows: the long ovipositor is bent, passed between the posterior legs, the abdomen is elevated almost to a right angle with the thorax, and the ovipositor guided by the anterior tarsi is forced with a ramming motion into the wood to the depth of from 2 to 3 inches.

The ovipositor is composed of three pieces; two, grooved and pubescent act as a sheath to the borer proper and do not enter the wood; the third has the appearance of a horse hair, is rather flattened and tapers somewhat to the tip, where it is armed with about 21 saw teeth at each side and about 14 on the upper edge. If we now make a cross section of the borer at this point we find that it consists of three pieces; the upper part horse shoe shaped with a T rail projection on the ends and the two lower parts each like half a horse shoe furnished with a groove in which the T rail fits easily and in such a manner that the pieces may slide upon each other without separating and to leave the borer capable of sufficient expansion to allow the egg to pass through the hollow centre.

In boring the ovipositor has not only a ramming, but also a sliding motion, the side pieces which do the cutting, being forced forward alternately until the desired depth is reached.

Pimpla has been supposed an Ichneumon, but I have long doubted this because I never found in the wood any larva upon which it could feed. I have during the past season watched many females ovipositing and have cut off the ovipositor when ready to be withdrawn and in no instance have I found a larva of any kind anywhere near the point reached by the borer and where the egg was deposited. The conclusion is therefore that the larva is a true wood feeder and not parasitic.

Messrs. Hulst and Weeks stated in the discussion following, that they had reached the same conclusions from independent observation.

Mr. Hulst gave an outline of a paper read by Prof. Macloskie of Princeton at the meeting of the A.A.A.S. on the Dynamics of the Insect Crust, and in the course of the discussion of this subject Mr. Cramer stated that he had observed in a larva of *Papilio philenor* that 24 hours after it was blown and mounted the oral parts were still in motion as though the insect were alive.

Prof. Mayer gave an account of how he had collected during the past season and secured many rarities in Lepidoptera.

Mr. Cramer exhibited and explained a device for blowing and preserving lepidopterous larvæ, which was universally approved by the members present. Mr. Cramer illustrated the subject by preparing a specimen. An abstract of his address was offered for publication. A. C. WEEKS, Rec. Secy.

Members are requested to note the change of place of meeting, and it is also desired that all those having books of the Society do return them as soon as conveniently possible, as the Library is about to be re-arranged and the books catalogued.

SOCIETY NEWS AND NOTES.

At the meeting of the Society Sept. 25th, 1884, were present 11 members. President J. B. Smith in the chair. Visitors: Messrs. J. G. Holland, D.D., and Mr. Claggis of Pittsburgh, and Mr. G. J. Angell of New York. On motion Dr. Holland was invited to sit as a corresponding member.

Mr. Wm. Beutenmuller was proposed for membership by Mr. Hulst, and Mr. G. J. Angell by Mr. Roberts.

Messrs. Julius Mohns, F. A. Stinner and Stephen P. Sammis were duly elected as members of the Society.

The action of the President and Secretary in arranging for exchanges with the Belgian Entomological Society, the Stettiner Entomol. Verein, and the Entomologist, of London was approved, and the Corr. Secretary was directed to endeavor to establish exchanges with all Entomological Societies and publications, and to accept any reasonable offer of exchange made by any other scientific Society or publications.

Mr. Smith stated the substance of a recent paper by Lieut. T. L. Casey, at this meeting presented to the Society, commenting on the division of *Harpalus viridiaeneus* and requesting the members to collect as many specimens as possible of that species in order that the correctness of Lt. Casey's action could be verified.

Mr. Weeks reported the capture of *C. modesta* on Staten Island: a new locality for this beetle, which in the vicinity of New York had been hitherto found only in one spot in New Jersey.

A discussion on the range of *Euptoieta claudia* was participated in by the Lepidopterists. The species is not uncommon, locally, around New York: Dr. Holland says it is not found near Pittsburgh.

Mr. Smith reported that in company with Mr C. H. Roberts he had thoroughly tested the trap described at Vol. VI, p. 60, of the Bulletin and had found it a complete success. This led to a discussion on the attraction of insects to light. Dr. Holland stated that the burning gas wells near Pittsburgh illumined the country for miles around, and insects were attracted by the thousands, so that a circle of scorched insects was each morning to be found. Among them were many large *Bombycidae* and principally males. Over 100 ♂ *Saturina io* were found one morning. He fears this may eventually cause the destruction of the larger *Bombycidae* in that vicinity; the larva of *io*, else common enough, is this season extremely rare. At an electric light a large number of very good species had been taken. The brighter and more intense the light, the greater its attraction to insects. Mr. Græf related the experience of some collectors, who threw a powerful light against a white sheet, giving a large white surface which proved very attractive.

Mr. Smith related his practice in the Catskills, pulling down a thin white blind to an open window and setting a lamp behind it. The insects flew to the white surface found their way into the room around the edges and quietly settled about the walls where they were taken next morning.

Mr. Schwensen had often noted the attraction of an electric light near the Central Park, to *Coleoptera*: *Carabidae*, and especially *Harpalini* came in considerable numbers. *Dytiscidae* and *Hydrophilidae* only when the wind was favorable - i.e. from the Park lakes.

The attraction of sugar to insects was then brought up, and Mr. Claggis who had collected during the past season in the Isle of Jamaica gave the result of his experience. Sugaring trees was without result. The flowers exercised a superior attraction. Flowers were so abundant that collecting at them was tedious, so he tried sugaring flowers, and with complete success. The flowers artificially sweetened swarmed with insects, while the others were deserted. Large *Bombycidae* too came to this bait that never came to sugar on trees. Other members gave their experiences with flowers as an attractor and Mr. Smith gave the result reached by Mrs. Fernald as stated by Prof. Fernald at the meeting of the Ent. Club of the A.A.A.S.

Messrs. Hulst and Holland discussed the date of the appearance of *Argynnis diana* in N. C. finding it ranged from latter part of June to the middle of August.

A. C. Weeks, Rec. Secy.

On our table is a "Synopsis of the North American *Trichopterigidae*" by Rev. A. Mathews, Gumley, England. Dr. Mathews is a well known authority on the family here monographed by him, and having the advantage of the material in the collection of Dr's. Leconte and Horn, his work is up to the present state of American collections. Significant is this passage in the introduction "The *Trichopterigidae* are probably the most extensive Family of the Coleoptera". Less than 100 species are catalogued in the paper, and there is a very large field therefore for collectors who will seek out these minute forms. The paper is an excellent one, and is published in the Trans. Am. Ent. Soc. XI, pp. 113—156.

We have also a "Synopsis of the *Philonthi* of boreal America" from the pen of Dr. Horn. This was a work much needed, because so many species in collection were named by Fauvel. but not described, and oft times the mss. name was synonymous with one before given or the species had been previously described. Great confusion therefore existed in collections. Dr. Horn now gives us a simple easily comprehended classification, dividing that part of the genus treated of by him into three genera—*Philonthus*, *Actobius* and *Cafius* — and about 118 species. The paper is published Tr. A. E. Soc. XI, pp. 177—244.

Table of Balaninus, *Germ.*

By Frederick Blanchard.

The following is offered for the purpose of making known an undescribed species of *Balaninus* recognized since the publication of Dr. Horn's synopsis Proc. Amer. Phil. Soc'y. 1873, p. 457. reference to which must be had for further details. For convenience the sinuation or angle formed by the outer or free edge of the femoral tooth with the continuation of the femur is termed the angle entering the femur.

First joint of antennæ shorter than the second. Mesosternum less convex ..... **7. caryatrypes.**

First joint of antennæ longer than the second. ....1.

1. Beak of ♀ longer than the body except in certain specimens of *nasicus* where it is only equal in length to the body ....2.

Beak of ♀ short, two thirds or three quarters the length of the body. Tooth of femur with the outer edge oblique, the angle entering the femur obtuse and more or less rounded ... .3.

3. Appendices of claws broad rectangular. Femoral teeth larger. Scape of antennæ in the ♀ long. ....**1. obtusus**, n. sp.

Appendices narrow acute. Thorax more convex. Scape of antennæ in the ♀ short barely exceeding in length joints one and two of the funicle....**2. uniformis.**

2. Tooth of femur with the outer edge oblique. The angle entering obtuse........4.

Tooth of femur with the outer edge perpendicular forming with the apex of the femur a right angle which is not rounded .... 5.

5. Scales beneath oval. Tibiæ moderately mucronate............ **3. nasicus.**

Scales beneath narrow, hair like. Tibiæ more strongly mucronate. Last ventral of the ♀ more deeply impressed ....**4. caryae.**

4. Thorax of ♀ longer than wide. Scape of antennæ long.

Metasternum of ♂ in well preserved specimens, with a small, rounded, condensed patch of yellow scales each side of the median line. Femoral tooth small, the angle entering rounded................. ....**5. rectus.**

Thorax of ♀ not longer than wide. Pygidium of ♂ concave at tip and glabrous, the depression surrounded by moderately long silken hairs. Scape of the antennæ of ♀ short, equal to joints one and two of the funicle. The angle entering the femur not rounded.................. .... **6. quercus.**

B. obtusus, n. sp. Form short, robust, clothed with cinereous scale like hairs above, varying in color from cinereous to ochreus and brown. beneath with elongate silvery or yellowish scales. Beak of ♀ two thirds or three quarters the length of the body, that of ♂ shorter; the base to the insertion of the antennæ blackened, distinctly punctured and more or less striate, the tip also darker. The antennæ are inserted at the middle of the beak in the ♂, behind the middle in the ♀; scape long in both sexes, the first joint of funicle longer than the second. Thorax moderately convex, the sides slightly rounded from base to middle, then strongly rounded, narrowed and sinuate to the apex, coarsely and densely punctured and covered with transversely arranged scale like hairs which form a paler vitta each side. Elytra about three times as long as the thorax, a little wider behind the humeri, the sides rounded to the tips which are slightly separated. Vestiture nearly unicolorous, or ochreous with irregularly placed brown spots, or brown sprinkled with paler spots. Femoral teeth strong, outer edge oblique, forming an obtuse angle with the continuation of the femur. Tibiæ moderately mucronate. Appendices of claws broad, nearly or quite rectangular, slightly rounded. Length without the beak, 6 to 8 mm.—♂. Abdomen with first and second ventrals broadly impressed, the last ventral impressed at tip, truncate and slightly emarginate. —♀. Abdomen convex, last ventral rounded at tip.

Mass. Beaten from Hazel-nut. N. H., (Tex. and Neb., Horn.)

Dr. G. M. Levette of Indianapolis has sent me specimens of *B. caryae* bred by him from Indiana Pecans. He has also bred *rectus* from acorns gathered in summer and brought from Arizona, the beetles appearing the following December indoors.

BIBLIOGRAPHY.

1. *Balaninus obtusus*, n. sp. 6—8 mm. N. H., Mass., Nebr., Tex.
2. *uniformis*, Lec. Pacif. R.R. Rep. 1857, p. 57; Horn, Proc. Am. Phil. Soc. 1873, p. 459.—4.5 to 7 mm. Can., Eastern and Middle States, Kans., Tex., Cal., Or.
3. *nasicus*, Say, Curc. N.A., p. 16; Am. Ent. edit. Lec., 1, p. 279; Gyll. Schoenh. Gen. Curc. 111, p. 377; Horn, Proc. Am. Phil. Soc. 1873, p. 460; *nasutus* ‖ Say loc. cit.; *rostratus* Gyll., loc. cit,, p. 374; *sparsus* Gyll., loc. cit., p. 379, 4.5—8.5 mm. Eastern and Middle States, Geo. Kans.
4. *caryae* Horn. Proc. Am. Phil. Soc., 1873, p. 460, 5 to 9 mm. Ind.
5. *rectus* Say, Curc. N.A., p. 16; Am. Ent. edit. Lec. 1, p. 279; Horn, Proc. Amer. Phil. Soc. 1873, p. 459; *rectirostris* Gyll. Schoenh. Gen. Curc. 111, p. 376; *Sayi* Gyll., loc. cit., p. 375. 5—7 mm. Middle and Southern States, Ariz.
6. *quercus*, Horn. Proc. Am. Phil. Soc. 1873, p. 458. 5—9.5 mm. Mass. Tex.
7. *caryatrypes* Boh. Schoenh. Gen. Curc. VII, 2, 276; Horn, Proc. Am. Phil. Soc. 1873, p. 458. 8—11 mm. Middle States and Westward.

◆

Note on the species of Gaurotes, *Le Conte*.

By Frederick Blanchard.

With the exception of the observation on the form of the mesosternum I am indebted to Dr. Horn for the following notes:

The genus *Gaurotes* as hitherto defined would only include *G. cyanipennis*. *G. abdominalis* and, as Mr. Ulke has informed me, *G. Cressoni* have the mesosternum simple as in the genus *Acmaeops*, not protuberant as in the first mentioned species. The superficial resemblance however, of the three species is remarkable. They differ as follows: *G. cyanipennis* has the antennæ entirely pale and the abdomen piceous with slight metallic lustre; *abdominalis* with the same form of body has from one to three basal joints of the antennæ piceous and the abdomen yellowish testaceous, while *Cressoni* with a more robust form of body has the antennæ, tips of femora, tibiæ and tarsi piceous and the abdomen as in *abdominalis*.

The variation in the form of the mesosternum is an indication of the instability of what are usually regarded as valid generic characters. A strict interpretation of the mesosternal structure would separate these species. For the present they might remain associated until a renewed study either better develops the difference between *Acmaeops* and *Gaurotes* or shows the necessity, of uniting them.

SYNOPSES OF LEPIDOPTERA.

By Rev. Geo. D. Hulst.

CHIONOBAS, *Bois.*

OENEIS, Hub.

1. semidea. Say. Am. Ent. III, pl. 50. *Oeno* Bois, *Also* Bois, *assimilis* Butl., *subhyalina* Curt., *eritiosa* Harr.

Wings above nearly uniform dark brown, the markings of the underside of the secondaries appearing through; the whole outer margin very narrowly lined with black. Beneath; primaries a little paler, marbled at apex with black and white; secondaries marbled with black and white, a broad dark band crossing center edged outwardly with white. The primaries have sometimes a single ocellus above and below near apex. White Mountains, Labrador, Rocky Mts. Expands about 2 inches.

2. Bore, Schn. Var. *Taygete* Hub. Zutr. Pap. 1, Nymph. IX, Oread. D, Nubilæ, 3, 1—4; *Bootes* Bois.

Wings above dark brown, female paler, somewhat yellowish, with darker marginal bands; outer border narrowly edged with black. Beneath, flecked with hoary at apex of primaries and on whole of secondaries except borders of the middle band. A darker submarginal band; middle band edged with black inwardly, white outwardly. Primaries sometimes with an almost obsolete ocellus near apex. Expands about 2 inches. Labrador.

3. Crambis, Frey. Neu. Beitr. V, pl. 440, f. 3 and 4. *Taygete*, H. S. *Also.* Moesch. *Oeno*, Scud.

Wings above varying from dark brown to yellowish brown, secondaries with design of lower surface showing through. Beneath, primaries like upper surface, hoary tipped; secondaries marked with blackish brown, yellow brown, and grayish white, with a darker middle band edged with gray; the outer border narrowly edged with black. The primaries have one or more ocellated spots submarginally above and below. Often a suggestion of these on under surface of secondaries. Expands about 2 inches. Labrador.

4. Jutta, Hub. Eur. Schm. f. 614 and 615. *Balder* 45.

Wings above dark brown with dark spots along the border in a yellowish field. Discal space of primaries almost black. Beneath, primaries much as above, but with a yellowish shade, and hoary at apex; secondaries marbled with brown black and gray, the inner half lightest, and this edged with gray outwardly. Black spots repeated in yellow field, but somewhat more indistinct. Expands 2—2.25 inches. Maine, Labrador.

Var. *a.* **Balderi,** Hub. Zutr. 981—982. *Balder,* Bois.

Smaller and less ocellated than *Jutta.*

5. **Uhleri,** Reak. Proc. Ent. Soc. Phil. VI, 143.

Wings above reddish brown, the secondaries somewhat the paler. Primaries along costa, on the veins, and along outer margin dull brown; secondaries crossed by many dull slightly russet brown striæ loosely forming a basal, median, extra median and marginal band. These formed by markings below showing through. Beneath, primaries white anteriorly striated with black, pale russet posteriorly; secondaries white, striated with black as shown above. All wings marked more or less with ocelli, generally one to three, these being more distinct beneath. Expands about 2 inches. Rocky Mts.

Var. *a.* **Varuna,** W. H. Edw. Can. Ent. 14, 2.

Smaller, generally a shade redder above, more ocellated. Montana.

6. **Chryxus,** Doub. Hew. Gen. Diur. Lep. II, 383, pl. 64. *Calais,* Scud.

Wings above ochrey yellow, the primaries often clouded from base to median space with brown, which generally takes the form of a broad diffuse dash, back of and at end of discal space. Costa and outer margins of both wings dark brown. Markings below often showing through all wings. Beneath, primaries white, striated with black along costa; blackish along margin; dark buff posteriorly. Secondaries white, heavily marbled and striated with black, showing more or less distinctly a broad median band black within edge, white outwardly. One or more ocelli submarginally on each wing, generally three on primaries, and one on secondaries, all repeated below. Female paler. without basal clouding on primaries. Expands 2—2.50 inches. Colorado, Rocky Mts.

7. **Ivallda,** Mead. Can. Ent. 10, 196.

Very much in markings as *Chryxus,* but with the upper surface fuscous instead of fulvous; there is a submarginal row of gray ochraceous spots between the nervures. Ocelli as in *Chryxus.* Expands 2.25 inch. Sierras between Nevada and Cal.

It is with extreme hesitation I write this as a species, inasmuch as its variation from *Chryxus* is only in coloration: a very frail basis for specific distinction. But where taken, it is entirely uniform in color, and this color has not been found, so far as I know, where specimens of *Chryxus* have been taken. It is a near offshoot from *Chryxus,* but may stand with specific rank until intergrades are found.

8. **Nevadensis,** Bois. Mss. Felder, Reise Nov. Lep. p. 489. *Californica,* Bois. *Iduna,* W. H. Edw.

Wings above fulvous ochreous; costal margin, base, and outer margin brown. Also on males a broad dash of brown posterior to discal space, outwardly including it in part, sometimes entirely and blending with costal margin. Secondaries somewhat paler than primaries, as are all the wings of the female. Beneath, primaries somewhat paler than above, somewhat striated with black along costa, hoary and marbled at apex; brown marginally. Secondaries, heavily striated and marbled with black on a dull white ground, these, as is usual, forming a broad more or less definite median band; darker towards margin. The primaries are more produced in the males than in the females, and the costa is less arched. This is however a tendency of the genus. Ocelli variable, the one near apex of primaries, and near anal angle of secondaries more permanent, the former, as far as I know, always present. Expands about 2.50 inches. Cal., Nevada, and Northward.

Var. *a.* **gigas,** Butler, Cat. Sat. Brit. Mus. p. 161, pl. 2.

Differs in having the ocelli of the primaries when present, not in a straight line. Vancouvers I.

I have given this species conscientious study, and have tried to convince myself that there are here 4 species or anything more than one and one variety. But I can not believe we have to do with more than one species and am not fully convinced of the validity of *gigas* as a variety. The various names have been based upon markings which are notably variable in all species of the genus. Mr. Butler's words with regard to *Coenonympha*; have more appropriateness spoken with regard to *Chionobas*: "the form of the local bands, and the constancy of the ocelli, can not be relied on".

In the preparation of this paper I have followed Staudingers arrangement of the species. The writings of Möschler and Scudder have not been overlooked; but I cannot agree with their conclusions.

For the generic characters of *Chionobas* and *Coenonympha* we refer to the synopsis of genera in Vol. VI.

A new insect injurious to Wheat.

By C. V. Riley.

The following description was presented to the Washington Entomological Society at its monthly meeting, Nov. 6th. The description is comparative with *I. tritici*, Riley, with which it is nearest allied.

Isosoma grandis, n. sp.

Female.-Length of body 4.2 mm., expanse 7.6 mm. Antennæ rather more slender and less clavate than in *tritici* and but half the length of thorax. Thorax with the mesonotum slightly more rugulose; wings larger and less hyaline than in the winged specimens of *tritici*, the veins extending to outer third, the submarginal nearly 4 times as long as marginal; legs with the femora less swollen. Abdomen not so long as thorax, stouter than in *triciti*, ovate-acuminate, approaching typical *Eurytoma*. Less hairy than *tritici*, especially about legs, the hairs of abdomen being less numerous, less regular and shorter. Coloration similar to that of *tritici*, but brighter and more highly contrasting. the pronotal spot larger and brighter yellow, the pedicel of antennæ yellow and the femora with a definitely limited suboval, yellowish spot below, near the tip, extending two-fifths the length of femur on front pair, smaller on middle pair and still shorter and less definite on posterior pair.

Larva.—Greenish-yellow in color. Average length 6 mm; otherwise of same proportions and structure as in *tritici*.

Pupa.—Average length 5 mm. Except in larger size and ample wing-pads undistinguishable from that of *tritici*.

Described from 24 females, reared from wheat stems in June, and taken by Mr. F. M. Webster at Lafayette, Indiana. The species is treated of in my forthcoming report as U. S. Entomologist and works in wheat much as *tritici* does. Its larger size, stouter build, aside from the other characters mentioned readily distinguish it, however; while from *hordei* Harris, *vitis* Saunders, and *elymi* French, it is still more readily distinguished.

SYNOPSES OF COLEOPTERA.

CALLIDIUM, *Fab.*

Contains species resembling *Phymatodes* in general form and specially characterised by the equal palpi. The species may be separated as follows:

Thorax and elytra blue.
  Thorax finely punctured, impressed................ ....**antennatus.**
  Thorax deeply punctured, not impressed..................... .....**janthinum.**
Thorax and elytra testaceous or yellow.
  Body testaceous.
    Elytra with raised glabrous lines........ ....**cicatricosum.**
    Elytra and thorax unicolorous, testaceous.................................**aureum.**
  Body black, thorax yellow, elytra variable..........................**hirtellum.**
  Body, thorax and elytra black........................ ....**vile.**

C. antennatum, Newn. Ent. Mag. V. 1838, p. 393; Lec. J.A.P. ser. 2. II, p. 34.

The entire insect is blue; elytra deeply punctured; thorax slightly atulaceous and variably impressed, and in ♂, wider than the elytra. The antennæ are longer than the body and thickened at the base, each joint in ♂ clubbed at outer end. The club of femora is larger in ♂ than ♀. Length .55 inch. = 14 mm. Hab. United States.

C. janthinum, Lec. J.A.P. ser. 2, II, p. 34; Dej. Cat. 3d ed. p. 355.

This species is generally smaller than preceding, violet or blackish blue, beneath almost black, and the elytra are wider than thorax. The antennæ are quite stout, tapering toward tip and are serrate. Length .40 to .52 inch. = 10—13 mm. Hab. Texas.

C. cicatricosum, Mann. Bull. Mosc. 1853, III, p. 246.

The thorax is marked by three longitudinal raised lines and is densely pubescent; the elytra are thickly coated with conspicuous hair, except where the surface is interrupted by raised glabrous lines which cross each other and present the appearance of net work. Length .50 inch. = 12.5 mm. Hab. Colorado.

C. aereum, Newn. Ent. Mag. V, 1838, p. 393; Lec. J.A.P. ser. 2, II, 1850, p. 33; *pallipes* Hald. Trans. Am. Phil. X, 1847, p. 37.

This species varies considerably in size and but little in other respects. The uniform testaceous color renders it readily distinguishable. Length .34—.50 inch. = 8.5—to 12.5 mm. Hab. Atlantic States.

C. hirtellum, Lec. S.M.C. No. 264, XI, 1873, p. 172.

The elytra are sometimes barely tipped with black and sometimes completely dark in color. The thorax is always distinctly yellow and the abdomen black. Length .25—.28 inch. = 6—7 mm. Hab. Colorado, California.

C. vile, Lec. S.M.C 1873, No. 264, XI, p. 172.

Readily known by the small size, black color, and coarse sculpture. Length .18 inch. = 4.5 mm. Hab. California.

XYLOCRIUS, *Lec.*

This genus presents another remarkable form. The antennæ are very stout, quite hairy, the thorax very convex and rounded at the sides, the elytra constricted behind the base and strongly rounded at tip and the entire surface deeply punctured and pubescent. Two species have been distinguished:

More slender, elytral punctures before middle gross, somewhat confluent, surface shining; behind middle finer, surface opaque .... **Agassizii.**

More robust, surface all shining, punctures large, foveate, irregular, more or less confluent .... **cribratus.**

X. Agassizii, Lec. Proc. Ac. Phil. 1861, p. 357.

The hair behind the middle of elytra is more dense, and 3d and 4th joints of antennæ about equal. Length .45 inch. = 12 mm. Habitat, California.

X. cribratus, Lec. S.M.C. 1873, No. 264, XI, p. 172.

Pubescence equal throughout; 3d joint antennæ one-half longer than 4th. Length .55 inch. = 15 mm. Hab. California, Nevada.

CERAMBYCOIDES.

Eyes coarsely granulated, front coxal cavities open behind (except in *Compsa*),........ **Cerambycini.**

Eyes variable, front coxal cavities angulated, closed behind................**Obriini.**

Eyes finely granulated.

Scutellum rounded, tibial spurs small, elytra not sinuate.................... 1.

Scutellum acutely triangular, elytra not sinuate..............................2.

Scutellum rounded, or broadly triangular (*Cyllene*), tibial spurs large, thorax never tuberculated, nor spinose; elytra not sinuate........................3.

Scutellum broadly rounded, thorax not tuberculate, nor spinose; sides of elytra deeply sinuate near the humeri ....4.

1. Legs long, slender, thighs pedunculated and suddenly clavate, front coxal cavities open behind.

Antennæ with poriferous system,...............................**Ancylocerini.**

Antennæ without poriferous system...........................**Rhopalophorini.**

Legs slender, thighs not pedunculated, nor clavate, front coxal cavities open behind.

Front coxæ rounded...**Paristemiini.**

Front coxæ transverse, cavities angulated..............................**Rosaliini.**

2. Front coxal cavities closed behind...............................**Callichromini.**

Front coxal cavities open... ....**Trachyderini.**

3. Tibiæ carinated...**Stenosphenini.**

Tibiæ not carinated...**Clytini.**

4. Prothorax rounded, never as wide as elytra at humeri.............**Agallissini.**

CERAMBYCINI.

Thighs not toothed behind.

Ligula more or less corneous, (*Oemes*).. 1.

Ligula membraneous.

Middle coxal cavities angulated, (*Cerambyci*)..................................2.

Middle coxal cavities rounded, (*Ibidiones*)..................................3.

Thighs beneath armed with a broad tooth, (*Curii*)..............................4.

1. Epimera of mesothorax large.

Front trochantins very distinct.

Palpi very unequal, dilated.

Prosternum laminiform, antennæ rough with elevated points, mesosternum very narrow.

Prothorax lobed at base...................................**Malacopterus.**

Prothorax constricted at base....................................**Oeme.**

Prosternum not laminiform, antennæ very hairy beneath, joints 3—6 with a terminal spine.

Body uniformly pubescent...**Eucrossus.**

Body with transverse bands of yellow pubescence..........................**Dryobius.**

Palpi short, equal, slender.
Front coxæ contiguous, hardly prominent, middle coxæ distant......**Haplidus.**
Front trochantins not visible..**Achryson.**
Epimera of mesothorax small............ ....**Gracilia.**
2. Antennæ 11-jointed, with recurved hooks on joints 3—6 (prothorax plicate, armed, bispinose).. **Hammaticherus.**
Antennæ 12-jointed, sericeous, serrate.......................................**Axestinus.**
Antennæ 11-jointed, without recurved hooks.
Front coxal cavities angulated; antennæ, thighs and elytra not spinose...........5.
Front coxal cavities rounded or feebly angulated...... .. ..6.
5. Frontal suture deep; metathorax without scent pores.
Prothorax uneven, tuberculate at sides........................ ...**Brothylus.**
Prothorax even (palpi equal)............................... .. **Stromatium.**
Frontal suture faint, scent pores distinct.
Elongate, prothorax even, antennæ very long....... ....**Osmidus.**
6. Scutellum acute, triangular, frontal suture very deep, antennæ very long, sulcate **Chion.**
Scutellum rounded behind.
Femora not strongly clubbed, antennæ not carinated.
Elytra with ivory spots, prothorax with dorsal callosities, and usually with lateral spines, antennæ unarmed.......................................**Eburia.**
Elytra without ivory spots, antennæ usually spinose.
Episterna of metathorax narrower behind, antennæ with sensitive spaces...... . **Romaleum.**
Episterna of metathorax parallel, antennæ without sensitive spaces **Elaphidion.**
Femora not strongly clubbed, antennæ carinated.
Antennæ slender.. ....**Aneflus.**
Antennæ stout, joints excavated beneath.........................**Eustroma.**
Femora strongly clubbed.
Antennæ bisulcate................................. ....**Tylonotus.**
Antennæ not sulcate...**Zamodes.**
3. Front coxal cavities closed behind....................... ....**Compsa.**
Front coxal cavities open behind..................................**Heterachthes.**
4. Form depressed, dull, slightly pubescent.................................**Curius.**
Form cylindrical, polished, glabrous..........................**Plectromerus.**

Ganimus Lec. is a synonym of *Malacopterus*. *Romaleum* has been formerly included with *Elaphidion*.

MALACOPTERUS, *Serv.*

Contains one species:

M. vittatus, Lec. S.M.C. No. 264, 1873, XI, p. 174.

A large testaceous species, sparsely pubescent, thorax and elytra punctured, the latter bearing two costæ and two narrow black lines. The mandibles present a singular character, being short, stout, acute at tip, and the external outline having a well defined obtuse angle near the tip, so that the front margin is straight and transverse. The legs resemble those of *Callidium*. Length .84 inch. = 21 mm. Hab. California.

OEME, *Newn.*

Contains four species separated as follows:

Thorax constricted at base, with a distinct tubular or cylindrical prolongation; elytra more or less distinctly costate.

Thorax densely punctured, a moderately impressed median line..........**rigida.**

Thorax punctured, a smooth median vitta..........**costata.**

Thorax more suddenly constricted; a transverse impression and plica on disk.......**strangulata.**

Thorax oval, more constricted at base than tip; on tubular prolongation at base; elytral costæ wanting, or the first only faintly indicated ....**gracilis.**

O. rigida, Say, Proc. Ac. Phil. V, p. 274; *linearis* Harr. Hartf. Trans. 1837, p. 85, pl. 1, f. 8; Lec. J.A.P. ser. 2, II, p. 20; *indecora* Newn. Ent. p. 8; Lec. l.c. 1852, p. 177; *mucita* Hald, Proc. Ac. Phil. IV. 1847, p. 374.

Color uniform ferruginous, antennæ very robust. Length .60 inch. = 15 mm. Hab. New York, Florida.

O. costata, Lec. S,M.C. No. 264, 1873, p. 174.

Color dark, slightly pubescent, the elytra are wider than the thorax, with three narrow lines or costæ, the spaces between sparsely reticulate. The male has the antennæ as long as the body, joints 3—6 armed with acute spines. Length .90 inch. = 22 mm. Hab. California.

O. strangulata, Horn, Trans. Am. Ent. Soc. 8, p. 133. pl. II, f. 7.

Piceous, subopaque, pubescence very short. Elytra densely and finely punctured, with three elevated lines on each. The thorax is very suddenly constricted, short, bears a transverse impression and plica and readily distinguishes the species. Length .76 inch. = 19 mm. Hab. Utah.

O. gracilis, Lec. Bull. Buff. Soc. N.S. 4, p. 27.

Easily distinguished from all the other species by the form of the thorax. Color is deep dark brown. Length .48 inch. = 12 mm. Hab. New York.

EUCROSSUS, *Lec.*

Contains one species:

E. villicornis, Lec. S.M.C. No. 264, 1873, XI, p. 175.

A large pale brown insect resembling *Oeme* but less slender. Thorax dull sericeous, with a broad median line and on each side a large cicatrix, commencing near the base, extending in front of the middle, then suddenly bent inwards for a short distance, and then turning forward suddenly abbreviated. Elytra sparsely punctured and thinly pubescent, armed at suture with small spine. Antennæ densely fringed beneath with long soft hair, becoming thinner and vanishing on 8th joint. Length .72—.96 inch. = 18—24 mm. Hab. Arizona, California.

DRYOBIUS, *Lec.*

Contains one species:

D. sexfasciatus, Say, Proc. Ac. III, 1824, p. 415.

A rare and beautiful insect easily recognized by the conspicuous bands of golden yellow pubescence, of which the thorax bears two and the elytra four, all except the anterior reaching from margin to suture. The hair on antennæ is very long. Length .75 to 1.10 inch. = 19—27.5 mm. Hab. Mississippi Valley.

HAPLIDUS, *Lec.*

Contains one species:

H. testaceus. Lec. S.M.C., No. 264, 1873, XI. p. 176.

A slender brownish insect easily known by the short slender palpi, and by the eyes being less deeply emarginate than in the other genera of the group, and scarcely embracing the base of the antennæ, which are inserted on a line with their front margin. Length .36—.56 inch. = 9—14 mm. Hab. California, Utah.

ACHRYSON, *Serv.*

Slender, subcylindrical species, with slightly dilated palpi. Two are known, distinguished as follows:

SYNOPSIS OF ACHRYSON.

Mesosternum wider, truncate at tip; elytra armed with terminal spine .....**surinam.**
Mesosternum narrow, subtriangular; elytra rounded at tip................**concolor.**

A. surinam, Linn. Syst. nat. ed. XII, p. 632; *longicolle* Deg. Mem. V, p. 117, t. 14, f. 11; *pallens*, Fab. Ent. Syst. I, 2, p. 297; *surinamense* Oliv. Ent. IV, 67, p. 42, t. 14, f. 93; Chev. Ann. Fr. 1862, p. 264.

Color ferruginous, elytra with a few oblong black points; antennæ darker, a little longer than the body; eyes black; thorax rounded. Length .65 inch = 16 mm. Hab. Middle States to Mexico.

A. concolor, Lec. S.M.C., No. 264, 1873, XI, p. 176.

Same form as preceding but smaller; uniform brownish testaceous, thinly clothed with long pale hairs; the head and thorax are coarsely punctured, the latter not deeply but so closely as to produce a reticulate appearance, and in the center of each puncture is a small puncture from which proceeds a long white hair. The elytra are paler, polished, with rows of very distant large punctures, from which proceed long flying hairs. Length .34 inch. = 8.5 mm. Hab. Texas.

GRACILIA, *Serv.*

Very small slender insects, piceous in color, and finely punctured and pubescent.

SYNOPSIS OF GRACILIA.

Elytra unicolorous, rounded at tip.
  Not shorter than abdomen.................................... **minuta.**
  Shorter than abdomen; prothorax more rounded........................**manca.**
Elytra fasciate, truncate and serrate at tip......... .... **fasciata.**

G. minuta, Fab. Spec. Ins. I, 1681, p. 235; Oliv. Ent. IV, 68, p. 41, t. 3, f. 31; *pygmæa* Fab. Ent. Syst. I, 2, p. 323; &c. &c.; *fusca* Hald. Trans. Am. Phil. X, 1847, p. 43; Lec. J.A.P. ser. 2, II, 1850, p. 24.

This species has been introduced in articles of commerce from Europe. It is piceous in color, finely pubescent. The antennæ are hairy, in ♂ longer, in ♀ shorter than the body. Length 25 inch. = 6 mm Hab. Atlantic States.

G. manca, Lec. J.A.P. ser. 2, II, p. 24.

This rare species is immediately distinguished by the abbreviated elytra and by the thorax which is shorter. Length .32 inch. = 8 mm. Hab. New York.

G. fasciata, Lec. S.M.C., No. 264, 1873, XI, p. 171.

Opaque black, pubescent, thorax alutaceous sparsely punctured; elytra more strongly punctured with the basal margin and a transverse fascia immediately behind the middle of white pubescence. Tip of elytra distinctly truncate with 3 or 4 serrations, the sutural and outer one prominent. Length .18 inch. = 4.5 mm. Hab. Lower California.

HAMMATICHERUS, *Serv.*

Contains one species, easily distinguished by the plicate, armed thorax, and bispinose elytra. It occurs rarely in Lower California.

H. mexicanus, Thoms. Class. Longic. 1860, p. 196.

AXESTINUS, *Lec.*

Contains one species:

A. obscurus, Lec. S.M.C., No. 264, 1873, XI, p. 177.

A large piceous insect with cinereous pubescence. Thorax longer than wide, narrowed in front with two discoidal impressions before the middle, sparsely coarsely punctured with feeble transverse rugae. Elytra densely punctured, bispinose at tip. Legs slender, thighs not clavate or spinose, tibiæ slender, hind tarsi with 1st joint scarcely as long as two following. Length 1.20 inch. = 30 mm. Hab. Valley of Rio Grande.

BROTHYLUS, *Lec.*

Contains two species distinguished as follows:

Thorax armed with an acute tubercle at middle	**gemmulatus.**
Thoracic tubercle obsolete	**conspersus.**

B. gemmulatus, Lec. Proc. Ac. Phil. 1859, p. 80.

olor fuscopiceous with short pubescence. The elytra are ornamented with scattered shining granules, larger at base and becoming smaller toward tip where they are only punctures. Length .67 inch. = 17 mm. Hab. Cal.

B. conspersus, Lec. Proc. Ac. Phil. 1859, p. 285.

Color nigropiceous, variegated with grayish hair. The dorsal aspect of thorax is tuberculate and the 4th joint of antennæ only one half as long as 3d or 5th in this and preceding species. The elytra are granulate as in preceding and bear two vague oblique fasciæ less pubescent. Length .73—77 inch. = 18—19 mm. Hab. Oregon.

OSMIDUS, *Lec.*

Contains one species.

O. guttatus, Lec. S.M.C., No. 264, 1873, XI, p. 178.

An elongate piceous species, densely covered with short uniform cinereous pubescence, interrupted on the elytra with small scattered denuded spots. Prothorax oval with two basal and two discoidal impressions very faintly marked. Scutellum triangular, rounded behind. Legs rather long, thighs stout, not clubbed, 1st joint of hind tarsi as long as two following. Elytra parallel, rounded at tip and with a small spine near, but not on the suture. Length .70—.96 inch. = 17—19 mm. Hab. Cape San Lucas.

STROMATIUM, *Serv.*

Contains one species:

S. pubescens, Hald, (*Anoplium*) Trans. Am. Phil. X., p. 34; Lec. J.A.P. ser. 2, II, 1850, p. 16.

Pale yellowish brown; elytra robust subcylindrical, nearly parallel, entire at tip, uniformly pubescent; antennæ. elytra and feet unarmed. Length .58 inch. = 14.5 inch. Hab. Pennsylvania.

Spilosoma latipennis, *Stretch.*

By Geo. D. Hulst.

June 7th this year captured a ♀ of the above species, from which eggs were obtained the same night. They differed from those of *S. virginica* in being of a dull white color.

The larva emerged June 13th. The body was white and very translucent, and loosely covered with long white hairs slightly sooty at the end. This with a greenish shading to the body, and an increasing sootiness to the hair remained till they reached the 4th moult.

After the 4th moult there was besides the dark shading, something of a red shading added to the long silky hairs giving a dirty reddish gray appearance.

After the 5th moult the larva was of uniform reddish brown color. The depth of color however varied in the different larvæ.

A year or two ago I raised a larva through the 4th moult, which remained pure white in color all through its history to that time. When full grown, the larvæ resemble very much the red brown larvæ of *S. virginica.*

The eggs were laid June 7th—8th; the larvæ emerged June 13th; 1st moult June 17th; 2nd moult June 20th; 3rd moult June 23rd; 4th moult June 26th; 5th moult July 1st. The larvæ began to form cocoon. which was after the fashion of its allies, July 8th.

I left for another part of the state at that time and by misfortune did not have a single one emerge.

Eggs were given to Mr. A. W. P. Cramer who also failed to raise them to maturity.

◆

Note on Dynastes.

By J. Doll.

Riding through "Hell's canon" in Colorado, I had the misfortune to break the stick used to urge upon my steed the necessity of motion—his motto seemed to be—no whip, no go. A substitute was absolutely necessary, and noticing a clump of mountain ash near a dry watercourse I dismounted, and cut a switch: looking about from force of habit, I noticed a large irregular dark clump near the tip of some branches; investigation revealed a *Dynastes* unlike any species that I have ever seen; further search resulted in the capture of a considerable number of other specimens, and I afterward captured over 100, some of them fully four inches in length.

Prior to that time I had carefully searched for insects of this description without success; but now knowing their habits I found them or traces of their presence everywhere that the mountain ash was found. They are always found near the tips of branches, where by means of their projecting thoracic horn they scrape through the soft bark to cause a flow of sap which is very sweet, and of this consists their food. When discovered they were largely *in copulo* and a few days afterward though I found traces of their presence everywhere in the shape of scraped ash branches, yet not another beetle did I see.

This shows that the peculiarly modified thorax is not entirely without value to the insect. Unfortunately my entire collection of Coleoptera, the result of several months careful collecting was stolen on my way home, and I cannot therefore give the specific name of the insect, which however was probably new.

◆

Notes on some Staphylinidae.

By George H. Horn, M. D.

Having had occasion to examine a series of *Edaphus*, having at hand the two types of *E. nitidus* Lec., the following result has been obtained. Of the two types one has two basal foveæ on one side and three on the other: is there the well marked median basal carina. The side on which there are but two foveæ is made so very evidently by the fusion of two of the foveæ. The second specimen and the one having the label is on each side trifoveate. The sutural stria of the elytra is fine but distinct. To this species *carinatus* Casey should be added as a synonym.

A certain number of specimens are irregularly foveate and I have seen one in which there were five foveæ, the three regular ones in a row and two nearly as large in front placed intermediately with the others.

On the other hand the transverse impression of the base of the thorax, in which the foveæ are situated becomes by degrees gradually less deep and the foveæ gradually smaller so that we notice a gradual disappearance of the carina which separates the two central foveæ and finally nearly an entire obliteration of it. Without intending to suggest the suppression of the species (*luculentus* Casey) founded principally on the obliteration of the median carina, I merely give my observation for the consideration of those who have still more material for study.

The carina at the base of the abdomen above is not on the "first segment" but on the first segment visible beyond the elytra.

Trogophloeus laticollis Lec. At first glance this species has the facies of an Oxytelus as remarked by Dr. Leconte. The type specimen (and unique) was obtained from the cabinet of the late Dr. Zimmerman, whose collection was made up of miscellaneous material from all parts of the world.

In examining the specimen I find the anterior tibiæ finely spinulose and the middle coxæ contiguous. It seems therefore to be *Haploderus* as originally described by Leconte and appears to be from Erichson's description and Duval's figure, uncomfortably close to *H. caelatus* of Europe. In any case the species is not a *Trogophloeus*.

LETTERS TO THE EDITOR.

THE FUTURE OF "PSYCHE".

To the Editor of the Bulletin of the Brooklyn Entomological Society.

Dear Sir.

In your issue for October 1884, vol. 7, p. 87 is a statement which misrepresents me and the position of *Psyche*, which I wish to correct, premising that I have no doubt the statement was made in good faith, and the misrepresentation unintentional.

You say "'Psyche' has a hard struggle for existence, but will not suspend just yet."

If *Psyche* ever suspends, it will not be because it has been worsted in the struggle for existence. It was never in better condition than this year, and I so stated at the meeting The phrase "just yet" implies a contemplation of ultimate suspension, which is not and was not in my mind. The "struggle for existence" which you mention is a voluntary struggle. I could dispense with any public solicitation of support, as some of my colleagues have urged me to do, but I choose to distribute the support as widely as possible, that the entomologists of North America may look upon the work as theirs rather than the property of any restricted group of persons. Support, aside from subscriptions, has been contributed already by sixty persons, from seventeen States.

I made the proposition for a consolidation of entomological periodicals not entirely of my own initiative, was chairman of the committee which reported against it, and did not oppose the report, as my proposition was intended to afford an opportunity to others to profit by it, and not for any purposes of my own.

Respectfully,
B. Pickman Mann,
Washington, D. C., Nov. 24, 1884. Managing Editor of "*Psyche*".

Note by Editor. The sentence quoted by Mr. Mann from p. 87, in my original minutes, adopted by the Club, in Mr. Mann's presence, reads: "'Psyche' has a hard struggle but will not suspend just yet." The words "for existence" do not appear in the original. Mr. Mann's language as written implies as he suggests: the remark as spoken, indicated that there was no present intention of suspending.

RHYSSA.

Dear Sir:

* * * * While I am writing let me say that I made some remarks at the last meeting of the Washington Entomological Society regarding the discussion as to the phytophagous habit of *Rhyssa lunator* by Mr. Geo. Gade on p. 204 of the November Bulletin. There is nothing better established by previous observers than the parasitism of *Rhyssa*, and I have myself proved it many years ago and have found its larva actually preying on that of *Tremex*. That false statements have been made by previous writers in reference to it is true, since the *Rhyssa* does not sting the Tremex larva as is generally stated. The *Rhyssa* larva seeks its victim and lives attached to it on the outside. Prof. Lintner has recently published the facts as communicated to him by me in the *Country Gentlemen* for April 17th, 1884, as follows:

"I have on several occasions had opportunity of closely studying not only the mode of oviposition, but of larval growth of *Rhyssa*. My sketches and notes are at home (written from Boscawen, N. H) but the salient facts bearing on your question, I can give from memory. In all instances where I have found the female depositing, it has been in trees infested with *Tremex columba*, and I have found her most numerous on badly affected or injured trees, or even on stumps or broken trunks, already partly decayed. The instinct to reach the egg or larva of *Tremex*, so dwelt upon in popular accounts, is imaginary. She bores directly through the outer part of the tree, and doubtless probes for a burrow; but her egg is consigned anywhere in the burrow; the young larva seeks it prey, and lives and developes without penetrating the body of its victim, but fastened to the exterior. This habit among parasites is much more common than is generally supposed A great many *Rhyssa* larvæ doubtless perish without finding food, and a great many females die in probing for a burrow, especially where they saw through wood that is sound and hard".

C. V. Riley.

Dear Sir:

Under the head of "Society News" in the last number of your Journal, Messrs. Gade, Hulst and Weeks give their views concerning the habits of this insect [*Rhyssa*]. An article furnished by me relating to this subject appeared in the "Canadian Entomologist" for December 1882, as contributing to the theory that this insect is not a parasite, and my observations concerning its habits have led me to hold views in agreement with the gentlemen named. The article appeared under the caption "Long stings" and an extract is as follows.

"My experience has demonstrated that while it may be a fact that these insects deposit their ova on the larvæ of the *Uroceridae* or other borers, they do not commonly do so. In every case that came under my observation, the long ovipositor, instead of penetrating through the burrow of a *Tremex* or other wood-borer, entered through wood that had not been previously attacked, and though I failed to discover the egg deposited, I am very much of the opinion that the deposition is oftentimes, if not generally made regardless of the contact with a larva. My observations were necessarily confined to such visitations from these insects as were made to a somewhat decayed stump of a beech tree, for though there were a number of oaks and other trees close by, their choice was for the beech, to which both species were constantly arriving and inserting their long ovipositors. At the close of each day I cut off, to the depth of six inches, such portions of the stump as had been attacked, but failed to detect in any of the cuttings either the burrow or larva of *Tremex* or other larva. I also noticed that the wood as exposed by such clippings as I had made, attracted the greatest number of these insects. I regard it therefor a matter of considerable doubt if either the *atrata* or *lunator* commonly deposit their ova in the body of wood boring larvæ, and it seems to me that if these ichneumon larvæ are carnivorous, they must possess the power of boring in search for their food. I do not suppose that these insects perform the great labor of inserting their long ovipositors upon the merest chance of meeting with a larva, but rather that they deposit their eggs at every insertion, my observations abundantly proving that they are not governed by any instinct in the selection of particular spots, so far as regards the presence of larvæ.

FREDERICK CLARKSON.

NOTE.—The foregoing letters of Prof. Riley and Mr. Clarkson were read at the November Meeting of the Society and provoked much discussion. None of the members had ever observed the matters mentioned by Prof. Riley and on the contrary Mr. Gade is positive that many of the logs frequented by the *Rhyssa* are not infested by *Tremex* or other woodboring larva; further *Tremex* is rare, and *Rhyssa* very common. The chief object of the paper read by him was to call attention to the structure of the ovipositor; the reference to habit was made as an inference from observations purely of a negative nature and was given prominence by the agreement of the experiences of the members present. Positive evidence such as that furnished by Prof. Riley of course overbalances all *negative* observations. Still it would seem that a vast lot of unnecessary boring is done by *Rhyssa*, that the great majority of all eggs laid must perish, and that nature has dealt hardly with it in the way of instinct which in some other species in the same order is so wonderfully developed. Further observation will be made next season. J. B. S.

* * *

Mr. Chas. Fuchs writes from San Francisco: "I am pleased as a child at the beginning of the collecting season here. The locality is said to be excellent. In San Matteo, Co., *Rosalia funebris* is found, as well as other pretty species. In Marin Co., one hours ride from here, I found a magnificient specimen of 4217 ♀; a beauty, two inches in length. *Amphicoma* I also found. I shall especially devote myself to collecting *Coniontis* which are common on the hills near the City. I am observing the larva of *Platycerus oregonensis* and hope to have some interesting notes for you in the course of the next few months."

It is a comfort to receive such a letter, even though it excite a mild sort of envy at our inability to take part in similar excursions and captures.

Mr. Ricksecker also writes from California. "Though it is December with us as well as with you, yet the more common sorts of butterflies are abundant, and we have had no frosts to amount to anything."

* * *

Mr. Henshaw sends good news for Coleopterists. He is preparing for the printer a new check list of N. A. Coleoptera and hopes soon to have it ready. Mr. Henshaw has been long at work upon a catalogue which is also fast nearing completion. Both works are sadly needed and Mr. Henshaw will earn the everlasting gratitude of Coleopterists if he will but let them have the books soon.

From Texas we received a considerable number of a large *Lycus* which Dr. Horn says is *L. Fernandezi* described from Mexico. The insect is an exaggeration of *cruentus*, and forms a notable addition to our fauna.

Mrs. C. H. Fernald sends with a label N. H. an insect doubtfully marked *Xylina tepida*, var Comparison with European material proves it to be *Xylina ingrica*, H. Sch. The species must be added to our fauna if the locality is correct.

* * *

Dr. S. W. Williston of New Haven sends for publication a classification of the *Syrphidae* and writes: "I have had so many requests for information in regard to classification of *Diptera* that I have concluded to devote all my study the coming year to the preparation of synopses of the different families, excluding the family *Muscidae* in its widest sense."

This is good news and will, we hope, create an interest in this neglected order there are a few other neglected orders, and if some of the few gentlemen engaged in their study would follow Dr. Williston's example and send us papers on family andgeneric classification some of the amateurs, who now turn to Coleoptera and Lepidoptera because they can learn nothing of other orders, would become *Dipterists*, *Orthopterists* or *Hymenopterists* Prof. Osborn has promised us a classification of *Hemiptera*, and Mr. Bruner one of *Orthoptera* We shall try and stir up an *Hymenopterists*, *Neuropterists*, and if possible a student of the *Arachnida*.

* * *

The Bulletin is a little late this month, but that is the printer's fault He says: Christmas and New Year come but once a year, while the Bulletin comes once a month. All sorts of concert programmes, cards, &c were shoved ahead of the "Bulletin", after it was half in type and partly printed. We are sorry it occured, but take this opportunity of wishing all our readers a very happy New Year.

BOOK NOTICE.

Revision of the STENINI of America North of Mexico. "By Thos. L. Casey, Lieut. of Eng'rs, Member of the Entomological Society of France", pp. 206 and 1 plate. This paper we have received from the author. In it the *Stenini* are carefully studied, and 174 species belonging to our fauna are described, the great majority new. The descriptions are models of completeness--perhaps unnecessarily complete, because group characteristics are repeated in each description: the synoptic tables appear clear and Mr. Casey is careful to define the terms used by him. Mr. Casey establishes the genus *Areus* for those forms in which the 4th tarsal joint is bilobed; but admits that it is perhaps unnecessary. He has had at least one predecessor who believed as he did. We quote Motschulsky (Bull. Mosc. 1860, I, p. 556 and 557 : "Il me parait juste de séparer les espèces á quatrième article des tarses bilobé comme genre particulier, de ceux qui l'ont simple et pour lesquelles on peut laisser le nom *Stenus*, tandisque pour le premières je proposerais celui de *Hemistenus*." *Areus* therefor is a synonym of *Hemistenus* Mots. and will probably not be recognized at present by American Coleopterists. As a whole, Mr. Casey's paper is a notable and desirable addition to our literature.

Society News.

Nov. 27th. – Twelve members present: Mr. Smith in the chair. Messrs. Angell and Beutenmuller, proposed at the October meeting were elected members of the Society. The proposition of the Ent. Soc. "*Iris*" of Dresden for an exchange of publications was accepted. Letters were read from Prof. Riley and Mr Clarkson, *in re* the habits of *Rhyssa*, and those letters were discussed and ordered published.

"A note on *Dynastes*" by Mr. Doll was read by Mr. Smith, and offered for publication. Mr Smith read a paper on "Species, Varieties and Races" which was offered for publication. Messrs. Hulst, Leng and Roberts joined in the discussion of the paper, Mr. Hulst thinks color in some cases may become a structural character, and structural characters- so called may prove less reliable than color The variation in the venation of the Geometridæ was cited, and the presence and absence of spurs on the hind tibia of one of the same species was referred to. Still in the main he agreed with Mr. Smith's views. Messrs. Leng and Roberts favored a name to designate every decided and well distinguishable form, whether the peculiarity is in coloration or otherwise, they favored a name to express a definite idea of a combination of structure and color and when the variation reached a point at which the combination failed to accord with the idea expressed by the name, a new name should be given. Their views were to the point that not only genera, but species were artificial divisions established to aid recognition of forms, and incapable of being absolutely limited.

Mr. Gade exhibited some specimens of wings bleached by the process suggested by Prof. Marsh for bleaching microscopic sections. i.e. by chlorine gas generated by hydrochloric acid or chloride of potash and led from the jar in which it is generated, into another. half filled with water. The result is excellent; but the time required is much greater than by the "Dimmock" process.

A proposition was made to change the evening of meetings to Tuesday, as many members were unable to attend on Saturday evening. Mr. Leng was directed to prepare a suitable resolution for the amendment of the by laws and it is desired that members send in their views concerning such change.

Dec. 29th.—Twenty-one members and visitors present, the President in the chair. Reports from the Executive and Publications Committee were presented; and also a notice that a motion for an amendment to the by-laws changing the night of meeting to the first Tuesday of each month, would be made at the next meeting by Mr. Leng. A committee of five was appointed to secure the incorporation of the Society. A further committee of five was appointed to try and arrange for an combination with "Papilio" to produce a monthly journal of general Entomology, to be published by the Society. Both committees to cooperate in a scheme for the establishment of a permanent fund to support such journal.

Mr. Richard F. Pearsall of Brooklyn was proposed as a member of the Society by Mr. Weeks.

Mr. Curley read a paper "On the differentiation into females, males and workers, of bees and other hording insects." Mr. Curley starts from a primitive solitary bee with a developed hording instinct. He shows how severe labor in providing for offspring will injuriously affect the reproductive powers, and also that insufficient nurture in the larva state will result in the greater or less imperfection of the same powers. He claims that these organs are the ones first affected by adverse circumstances, and last to be developed. From these facts he supposes a season of want, or other inability of the parent adequately to provide for all her offspring in the larval state. The severe labor of the mother and inadequate food of the larva would inevitably tend to produce imagines more or less imperfect, and the reproductive organs, as least essential to the life of the insect would be the first to suffer. In the ♀ the power of reproduction would be largely lost, yet, yet the hording instinct would be transmitted; and, unable themselves to found colonies, these imperfect females cling to their home, and labor for its common benefit. The result is, that the mother bee largely relieved of the care of providing food is better able to procerate her kind, and the larvæ, better feed, are more fully developed. These fully developed insects, of course themselves found colonies; but in competing with the worker community are at a disadvantage. Mr. Curley interestingly shows how by accumulation of experiences, and a transmission of instincts the present community of hive bees became established. The effect of food on the development of insects was discussed and the habits of the bees in creating queens from worker larvæ was detailed.

Extended discussion followed this paper in referrence to the effect of lack of food upon the colors and maculation of insects in general. Mr. Weeks gave account of a brood of *antiopa*, which though neglected in every possible way, still managed to reach the imago state, but were not only very small in size; but very aberrant in maculation. Especially the band of blue spots within the yellow marginal band was often absent, and often but faintly indicated, seldom entirely complete. Mr. Frank cited the effect of food plant upon the colors of *Cecropia*, and other members joined in the discussion. Informal discussion and exhibition of specimens followed until the Society adjourned.

A. C. Weeks, Rec. Secy.

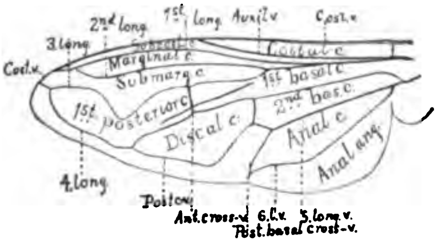
Members are hereby notified that at the January 1885 meeting, a proposition to incorporate the Society will be acted upon. and that a plan to extend the scope and usefulness of the Society and making non residents eligible to membership will be discussed. Officers for the ensuing year will also be elected, and members are earnestly requested to attend. C. H. Roberts, Corr. Secy.

On the classification of North American Diptera.

(First paper.)

BY DR. S. W. WILLISTON.

It is proposed here, in order to render the study of the neglected order of diptera less difficult, to present tabular synopses of the families and genera, with remarks upon their structure and external characters. The work involved is necessarily very great, and the families cannot at present be given in their natural sequence. The next paper will shortly be ready, containing a classification of the *Xylophagidae* and *Stratiomyidae*, and some time during the year will follow one giving a tabular classification of the families, with plates showing the more important structural characters. The present paper is extracted from a monograph of the North American *Syrphidae*, now ready for the press. It is the result of a careful study of nearly two hundred and seventy five species, occurring within our limits. The following figure will explain sufficiently the terms here used; a discussion of the terminology of the order will accompany the paper on the family classification.



CHARACTERS OF THE FAMILY SYRPHIDAE.

A false longitudinal vein between the third and fourth longitudinal veins; fourth longitudinal vein united at its extremity with the third; one submarginal cell, three posterior cells; basal cells large; face without subantennal grooves; two pulvilli.

Head hemispherical, often elongated or produced in the lower part, as broad or a little broader than the thorax. Face moderately broad, bare, or clothed with short pile or dust, excavated in profile under the antennæ and projecting below, or with a distinct protuberance near the middle part: never with longitudinal furrows or lateral ridges, usually convex transversely, sometimes with a median ridge. Oral opening large; proboscis rarely much elongated, usually but little projecting, and, when at rest, concealed within the mouth; palpi one-jointed; labrum, epipharynx, hypopharynx, maxillæ and labium present. Front never excavated, often swollen, sometimes with a more or less elongate process which bears the antennæ. Antennæ usually porrect, approximate at their base, three-jointed, the third joint more especially of varied shape, usually flattened and with a dorsal bristle, either bare or plumose; very rarely the third joint is not flattened, and is provided, at the tip with a terminal style. Eyes large, bare or pilose, in the male usually contiguous between the base of the antennæ and ocelli. Ocelli always present. Thorax comparatively large and robust, moderately arched above; scutellum large, hemispherical, often translucent, rarely furnished with spines on its border. Abdomen composed of five or six visible segments, rarely with only four. Hypopygium usually not prominent. Shape of the abdomen very various; slender, linear, clubbed, short, oval, and all intermediate forms. Legs usually weak, sometimes strong; the hind femora not infrequently moderately or much thickened, the hind tibiæ not rarely arcuated and compressed, metatarsi rather long, coxæ short; the hind coxæ, femora and tibiæ, more especially in the male, in not a few species armed with spurs, protuberances, or spines. Macrochatæ rarely present in any part of the body; the body generally thinly pilose or nearly bare, but sometimes clothed with thick pile. Wings comparatively large, when at rest folded together over the abdomen, or half open; third longitudinal vein never forked, frequently with a more or less deep curvature on the outer part; marginal cell open or closed, the fourth vein terminates in the third vein at or before the tip; neither of the intercalary veins present; anal cell always closed before the border of the wing; small cross-vein before or beyond the middle of the discal cell; *between the third and fourth longitudinal veins and nearly parallel with them there is a false or spurious vein,* nearly always present, and characteristic of the family.

SYNOPTIC TABLE.

A.—Anterior cross-vein of the wings distinctly before the middle of the discal cell, usually straight and rectangular; third longitudinal vein rarely with a distinct curvature into the first posterior cell; hind femora usually slender, rarely thickened.

B.—Third joint of antennæ with a terminal style........................**Cerinae.**

BB.—Antennæ with a dorsal bristle.

C.—Marginal cell of the wings open, i.e. the second longitudinal vein terminates in the costa.

D.—Antennæ longer than the head, rather large species........**Microdoninae.**

DD.—Antennæ as long or shorter than the head.

E.—Abdomen with only four visible segments..... .... **Pipizinae.**

EE.—Abdomen with five or six visible segments.

F.—Face rounded, receding, not tuberculate, pilose............**Pipizinae.**

FF.—Face tuberculate, or at least the oral margin in front is not receding but more or less produced.

G.—Front long, much narrowed above in the female, cheeks narrow, face considerably narrowed below, abdomen frequently contracted beyond the base, more or less slender.................**Bacchinae.**

GG.—Face widest below, or at least but slightly narrowed.

H.—Abdomen in outline linear or oval, never narrowed beyond the base, that is in outline not club-shaped.

I.—Color chiefly reddish or lutescent..............**Brachyopinae.**

II.—Color not chiefly reddish or lutescent.

J.—Metallic green, metallic green and black, or black species, rarely with luteous markings at base of abdomen, humeri and face; abdomen never with entire shining cross-bands.... **Chilosinae.**

JJ.—Black or greenish black species with yellow or yellowish stripes or bands, or at least with entire shining cross-bands on abdomen.

K.—Face black; abdomen usually slender, with yellow or greenish yellow interrupted cross-band....**Melanostominae.**

KK.—Face partly or wholly yellow; abdominal markings yellow.

L.—Dorsum of thorax with yellow lateral stripes....... **Xanthogramminae.**

LL.—Dorsum of thorax without yellow lateral stripes.... **Syrphinae.**

HH.—Abdomen contracted beyond the base, in outline more or less club-shaped; small species........................ ...**Ascinae.**

CC.—Marginal cell of the wing closed and petiolate....... ....**Volucellinae.**

AA.—Anterior cross-vein near or beyond the middle of the discal cell, usually oblique, the hind femora frequently thickened.

M.—Antennæ with a dorsal bristle.

N.—Third longitudinal vein bent deeply into the first posterior cell.

O.—Marginal cell closed and petiolate.....**Eristalinae.**

OO.—Marginal cell open......... ......**Mallotinae.**

NN.—Third longitudinal vein, only gently curved.

P.—Arista plumose.

Q.—Marginal cell closed..........**Volucellinae.**

QQ.—Marginal cell open..........**Sericomyinae.**

PP.—Arista bare or pubescent.

R.—Thorax with distinct yellow markings...... **Milesinae.**

RR.—Thorax without yellow markings...... **Xylotinae.**

MM.—Antennæ with a terminal style.............**Cerinae.**

MICRODONINAE.

Anterior cross-vein near the base of the discal cell, or near the middle, and more or less oblique. Marginal cell of the wing open. Legs slender. Femora not thickened. First and third joints of the antennæ elongate, the second more or less so. Large species.

A.—Scutellum thickened, usually with two points; face rounded, not tuberculate, pilose; without distinct yellow markings............... **Microdon,** Meig.

AA.—Face produced downwards, obtusely convex on lower part, yellow with black median stripe; third longitudinal vein with a distinct curvature: thorax with lateral yellow interrupted stripes; abdomen banded. (*Chrysotoxum*).

PIPIZINAE.

Anterior cross-vein near the base of the discal cell, rectangular, the third vein usually straight, antennæ a little elongated or short; marginal cell open; face rounded or tuberculate, receding above the oral margin; mostly small, nearly bare, finely punctulate species, with short, oval abdomen; hind femora rarely somewhat thickened.

A.—First and second joints of antennæ very short, the third large, subquadrate, with a sub-terminal arista; abdomen very convex, the venter deeply excavated..... **Nausigaster,** Will.

AA.—First two joints of antennæ not unusually shortened, the arista basal, eyes pilose.

B.—Face evenly rounded, not at all projecting in profile, dark, without yellow, pilose.. **Pipiza,** Fall.

BB.—Face somewhat tuberculate below, partly or wholly yellow; abdomen oval, obtusely rounded behind; finely punctulate, black or black and red, not banded.. **Paragus,** Latr.

CHILOSINAE.

Small to moderately large species, never with light markings other than luteous spots sometimes present at the base of the abdomen, scutellum, lower part of the face, etc.; usually the color is uniformly black, with or without metallic greenish markings or wholly deep shining black, the abdomen never with entire cross-bands of any kind. Antennæ elongate or short, the face with a distinct tubercle, or if not, the oral border in front is projecting; abdomen oval, never elongate or club-shaped; marginal cell of wings broadly open, third longitudinal vein nearly straight, anterior cross-vein near the base of discal cell.

A.—Hind femora distinctly thickened.

B.—Antennæ elongate; body clothed with sparse tomentum; all the femora thickened and with a row of short spines below.......... **Lepidomyia,** Loew.

BB.—Antennæ short, all the femora not thickened.

C.—Scutellum unusually large, nearly square in outline; eyes of male separated by the ocellar tubercle.................................**Chalcomyia**, n. g.*

CC.—Scutellum not unusually large, considerably broader at the base; eyes of male contiguous...................................**Myiolepta**, Newm.

AA.—Hind femora slender.

D.—Face and front never with transverse wrinkles.

E.—Epistoma produced, face without tubercle............**Psilota**, Meig.

EE.—Face tuberculate, the oral margin never protuberant.....**Chilosia**, Meig.

DD.—Front in female, or the face in both sexes also with transverse wrinkles; hind border of scutellum sharp; false vein of wing usually obsolete.... **Chrysogaster**, Meig.

MELANOSTOMINAE.

Small, elongate, thinly pilose species, deep black or shining green, the abdomen usually slender, with interrupted bands of bright yellow, orange or greenish yellow color (*Syrphus simplex* from the West Indies has a black face and entire shining metallic abdominal cross-band); face uniformly black, or at least never with light ground-color. Antennæ short, face tuberculate, marginal cell of wing open, third longitudinal vein of wing only gently curved, anterior cross-vein near the base of discal cell; legs slender, hind femora never thickened.

A.—Wings not longer than the abdomen; ocellar tubercle large, prominent; abdomen depressed, long, elliptical, somewhat narrowed toward the base, the lighter markings ferruginous or orange-yellow..................**Pyrophaena**, Schiner.

AA.—Wings longer than the abdomen; ocellar tubercle not unusually large; abdomen more slender, the cross-bands yellow or greenish yellow, sometimes shining metallic.

B. —Front tibiæ and metatarsi of the male dilated, those of the female slightly widened...................................**Platychirus**, St. F. & Serv.

BB.—Front tibiæ and metatarsi in both sexes slender, not widened.

C.—Distance between the eyes below less than in the middle of the face, front of female considerably narrowed above (*Baccha*).

CC.—Eyes not convergent below......................**Melanostoma**, Schiner.

BACCHINAE.

(To this group but a single genus is referred. Some species belonging under *Melanostominae* may be sought for here; the long front, extremely narrowed cheeks with the width of the face being conspicuously less below will distinguish those species belonging here in which the abdomen is not elongate and club-like. Moreover, such species are chiefly from the West Indies and Central America.)

A.—Wings with dark markings, or the abdomen very slender..........**Baccha**, Fab.

---

* Type, Myiolepta æra Loew.

XANTHOGRAMMINAE.

Mostly elongate, small, thinly pilose species, deep shining black or shining green, with bright yellow markings on face, lateral dorsal margins of thorax, and abdomen. Antennæ short, face tuberculate; marginal cell of wings wide open, third longitudinal vein only slightly curved, small cross-vein near the base of discal cell; legs slender; hind femora rarely thickened (*Mesograpta*).

A.—Eyes of male with an area of enlarged facets above; fourth segment of abdomen in both sexes with two yellow median stripes and an oblique spot on each side.... **Allograpta,** O. S.

AA.—Eyes of male wholly without an area of enlarged facets above; fourth segment of abdomen fasciate.

B.—Ocelli situated near the vertex; abdomen oval, of six visible segments; thorax without median dorsal cinereous line............. **Xanthogramma,** Schiner.

BB.—Ocellar tubercle remote from the vertex; slender species.

C.—Dorsum of thorax with a median cinereous line....... **Mesograpta,** Loew.

CC.—Dorsum of thorax without such line........ **Sphoerophoria,** St. F. & Serv.

SYRPHINAE.

Rather large species*, black or greenish black, usually with yellow abdominal bands; the face always wholly or in part yellow, the dorsum of thorax without yellow lateral stripes; moderately pilose. Marginal cell of wing wide open, third vein rarely (*Didea*) curved into the first posterior cell, anterior cross-vein near the base of discal cell. Antennæ short, face tuberculate**, abdomen oval, rarely elongate, never club-shaped; legs slender, hind femora never thickened.

A.—Thickly pilose species; abdomen quite oval, broader beyond the middle. Basal portion of abdomen yellow, terminal portion black, wings with a dark spot...... **Leucozona,** Schiner.

AA.—Rather bare species; abdomen with yellow bands, either all entire or one or all interrupted.

B.—Hind femora extraordinarily thickened. (*Syritta*).

BB.—Hind femora not thickened.

C.—Eyes of male with an area of enlarged facets above; front very convex; hypopygium very small.......................... **Catabomba,** O. S.

CC.—Eyes of male without an area of enlarged facets above; front moderately convex; hypopygium not very small.

---

* Species of *Paragus* (*Pipizinæ*) will be sought for here; they are small, finely punctulate, nearly bare, with or without the abdomen more or less red.

** If the face is concave, from antennæ to oral margin, and the hind femora very much thickened compare *Syritta* (*Xylotinæ*).

D.—Sixth abdominal segment of the male as long as the two preceding together, but narrower, somewhat tubular, unsymmetrical: on underside of the seventh segment with two long, linear, sub-parallel appendages. arcuate, bidenticulate at the end, imbedded in grooves when at rest. In the female the fifth segment half as long as the preceding. Scutellum much raised, exposing metanotum......, ...**Eupeodes**, O. S.

DD.—Hypopygium without slender appendages, sixth segment of male not peculiar; fifth segment of female one third or one fourth as long as preceding segment.

E.—Third longitudinal vein with a distinct curvature into the first posterior cell; third joint of the antennæ elongate-oval..........**Didea**, Macq.

EE.—Third longitudinal vein straight or gently curved; third joint of antennæ short oval..................................**Syrphus**, Fabr.

ASCINAE.

Small, slender, elongate, thinly pilose species, with more or less yellow markings on head and abdomen. Antennæ short, epistoma produced; marginal cell of the wings open, third longitudinal vein straight or gently curved, anterior cross-vein near the base of the discal cell and rectangular, abdomen contracted towards the base, the greatest width beyond the middle, in outline club-shaped or spatulate; hind femora thickened.

B.—Epistoma produced anteriorly, in profile deeply concave from antennæ to tip; third joint of antennæ nearly orbicular................**Sphegina**, Meig.

BB.—Epistoma produced more downward, in profile slightly concave from antennæ to tip...**Ascia**, Meig.

BRACHYOPINAE.

Moderate sized, nearly bare species, chiefly or wholly reddish or luteous; or, if in large part black, without light yellow markings. Antennæ short, abdomen not club-shaped; anterior cross-vein before middle of the discal cell, marginal cell wide open.

A.—Epistoma produced into a long slender porrected snout; femora slender; the third longitudinal vein joins the costa beyond the tip........**Rhingia**, Scopoli.

AA.—Face not so produced, hind femora more or less thickened.

B.—Face carinate, abdomen oval.. ....**Brachyopa**, Meig.

BB.—Face produced, obtusely tuberculate, thorax with bristles, abdomen elongate **Eugeniomyia**, Will.

VOLUCELLINAE.

Mostly large species, uniform in color or variable. Third joint of the antennæ more or less elongate, the arista always pilose; eyes usually pilose; body nearly bare or thickly pilose; abdomen short, thick, strongly convex above; legs slender, marginal cell of the wings closed and petiolate, third longitudinal vein gently curved, the fourth vein joins the third a considerable distance before the tip; anterior cross-vein usually near the base of discal cell; legs slender, hind femora never thickened.

A.—Arista very densely plumose, appearing like a solid mass....**Copestylum,** Macq.
AA.—Arista feathery plumose.................................**Volucella,** Geof.

ERISTALINAE.

Large species, uniform in color or more or less variegated, thinly or thickly pilose; third joint of antennæ short, arista bare or thinly pilose; abdomen short, broad, arched; hind femora sometimes much thickened; marginal cell of wings closed and petiolate; third longitudinal vein with a deep concavity into the first posterior cell; anterior cross-vein near or beyond the middle of the discal cell, oblique.

A.—Thorax never with yellow spots.
  B.—Frontal triangle of male strongly protuberant.........**Doliosyrphus,** Bigot.
  BB.—Frontal triangle of male evenly arched......................**Eristalis,** Latr.
AA.—Thorax with yellow spots.
    C.—Hind femora without a projection below..............**Pteroptila,** Loew.
    CC.—Hind femora with a projection below near the end. (*Milesia.*)

MALLOTINAE.

Mostly large, thickly pilose species; antennæ short*; the third joint not longer than broad, arista basal, bare; hind femora thickened; marginal cell of wings open, third longitudinal vein deeply curved into the first posterior cell, anterior cross-vein at or beyond the middle of discal cell, oblique; hind femora thickened.

A.—Arista plumose (*Sericomyinæ*).
AA.—Arista bare.
  B.—Face with a longitudinal ridge in the middle; hind femora strongly thickened and with an angular protuberance below, near the end............ **Tropidia,** Meig.
  BB.— Face not distinctly carinate; tuberculate or rounded.
    C.—Hind coxæ and tip of hind tibiæ in the male with spurs; eyes of male broadly separated........................(*Polydonta* ‖) **Triodonta.**
    CC.—Hind coxæ and tip of hind tibiæ in the male without such spurs, or if so, the abdomen is elongated and cylindrical.
      D.—Thorax and scutellum very densely pollinose above; the face in the male more tuberculate than in the female..............**Pterallastes,** Loew.
      DD.—Thorax and scutellum not densely pollinose above.
        E.—Third joint of antennæ broad, thorax not vittate.
          F.—Thickly pilose...................................**Mallota,** Meig.

---

* *Chrysotoxum* may be sought for here: the antennæ are elongate, and the dorsum of the thorax has yellow lateral stripes.

FF.—Thinly pilose, hind tibiæ in the male with an internal, median spur
Teuchocnemis, O. S.

EE.—Third joint of the antennæ ovate; thorax usually with distinct stripes: eyes of male broadly separated.................. **Helophilus** Meig.

SERICOMYINAE.

Large species; antennæ short, the third joint scarcely longer than broad; arista basal, plumose; anterior cross-vein of wings oblique, near the middle of discal cell; hind femora sometimes thickened.

A.—Moderately pilose; abdomen with yellow interrupted cross-bands, third longitudinal vein never considerably curved..................... **Sericomyia**, Meig.

AA.—Thickly pilose, abdomen uniformly black; third longitudinal vein considerably curved.. **Arctophila**, Schiner.

XYLOTINAE.

Anterior cross-vein near or beyond the middle of the discal cell; arista dorsal, bare; third longitudinal vein only gently curved, marginal cell open; thorax without yellow markings other than sometimes on the humeri.

A.—Long, slender, abdomen narrowed toward the base (*Baccha*).

AA.—Abdomen never linear or club shaped.

B.—Nearly bare species, especially on the abdomen, the pile never long or dense; eyes bare.

C.—Face strongly carinate; hind femora thickened, with an angular protuberance below near the end........................ ..... **Tropidia**, Meig.

CC.—Face not carinate.

D.—Third segment of the abdomen in the male very much contracted, cylindrical, the hind femora much thickened, with a bifid spine below at the tip. Eyes very large, face small............... **Senogaster**, Macq.

DD.—Hind femora more or less thickened, with spines or bristles below, never with a bifid spine near the tip.

E.—Hind femora very much thickened, anterior cross-vein rectangular.....
Syritta, St. F. & Serv.

EE.—Hind femora never remarkably thickened, hind coxæ often with spinous process; cross-vein always oblique................ **Xylota**, Meig.

BB.—Large pilose species, the abdomen always abundantly pilose.

F.—Scutellum, margin of thorax and pleuræ with bristly hairs; face distinctly tuberculate; femora slender. abdomen without yellow markings........... .... **Chrysochlamys**, Rond.

FF.—Thorax wholly without bristly hairs.

G.—Face short, not produced, concave from antennæ to tip, not tuberculate, transversely arched; hind femora more or less thickened.

H.—Abdomen elongate .... **Brachypalpus**, Macq.

HH.—Abdomen very broad, thorax densely pilose, very large species.
Pocota, St. F. & Serv.

GG.—Face produced, longer than the front.

I.—Face produced forward, pointed, concave from the antennæ to tip, not tuberculate, sub-carinate, eyes of male contiguous or nearly so in front of ocellar tubercle; hind femora thickened, abdomen without yellow markings.....**Crioprora,** O. S.

II.—Face not evenly concave, tuberculate.

J.—Third joint of antennæ produced above into a conical process, terminating in the thickened arista; femora not thickened........................**Merapioidus,** Big.

JJ.—Third joint of antennæ transversely oval, but little broader than long; femora rarely thickened............. **Criorrhina,** (Meig.) Macq.

MILESINAE.

Large species; thinly pilose or nearly bare, with yellow spots or lateral stripes on the thorax above. Anterior cross-vein at or beyond the middle of discal cell and oblique; third longitudinal vein usually only gently curved; arista dorsal, bare; hind femora moderately thickened and elongate.

A.—Hind femora with a conical protuberance below near the end.

B.—Marginal cell of wing open; antennæ more or less elongated........ **Spilomyia,** Meig.

BB.—Marginal cell closed and petiolated; antennæ short.....**Milesia.** (Latr.) Fabr.

AA.—Hind femora without such protuberance; marginal cell open.

C.—Dorsum of thorax with yellow lateral interrupted stripes; third joint of antennæ elongate.................................**Chrysotoxum,** Meig.

CC.—Dorsum of thorax not so striped; third joint of antennæ not elongate.

D.—Antennæ inserted high up on a conical projection, front short, face much produced downward; antennæ longer or shorter than the head.... **Sphecomyia,** Latr.

DD.—Antennæ short, situated low down, near the middle of the head in profile, face not longer than the front........ **Temnostoma,** St. F. & Serv.

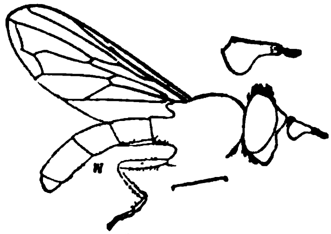
CERINAE.

A.—Rather large, elongate species, nearly bare; antennæ longer than the head. second and third joints swollen, terminating in a short thickened style; third longitudinal vein strongly angulated, emitting a stump of a vein into the first posterior cell..**Ceria,** Fabr.

AA.—Small species, nearly bare, not elongate; first two joints of the antennæ very short, third elongate, dilated below near the base, and with a short thickened style...**Pelecocera,** Meig.

* * *

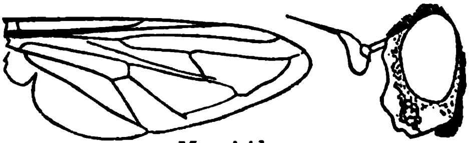
There is doubt about the determination of one of the above genera, M. Bigot, claiming (Wien. Ent. Zeit. vol. iii. pp. 217, 320) that what I have named *Euceratomyia* is the same as his genus *Merapioidus*. If



Pelecocera.

so my determination of *Merapioidus*, as shown in the figure below, is incorrect, and the genus yet lacks a name.

Upon further careful study I am convinced that *Euceratomyia* is doubtfully distinct from *Pelecocera* of Europe. The only difference is in the third joint of the antennæ, and this, though apparently striking, is scarcely of generic value, at least as long as the genus *Pelecocera* contains so few species. In size, coloration, and structure, otherwise, my species *P. pergandei* fully agrees with some of the species placed in the genus. Now if Mr. Bigot is right, his genus *Merapioidus* is a synonym of *Pelecocera*; but I will await further evidence before assuming that he is, and I must here defend this genus. It is quite unnecessary to point out the differences between *Pelecocera* and what I here call *Merapioidus*, a genus whose typical species is of about the size and shape of an *Eristalis*; there is scarcely any resemblance.



Merapioidus.

All the known genera from the United States have been examined. Some supplementary notes will be given in the next paper.

M. AUG. CHEVROLAT.

We are sorry to learn from M. A. Sallé, of the recent decease of that eminent coleopterist, in the 86th year of his age. M. Chevrolat was well and favorably known wherever Coleoptera were studied, and he worked at his favorite science with an energy and versatility peculiar to his nation. In 1862 Dr. Hagen enumerates 91 articles as from his pen, and M. Chevrolat has not flagged in his efforts since. One by one the men eminent in our favorite science drop off, leaving however their mark in the classification of the order upon which they worked.

SOCIETY NEWS.

Jan. 31st.—Twenty members present. Prof. Fillon visitor. Mr. Richard F. Pearsall was elected a member of the Society. The report of the Committee on Incorporating the Society was made, relating that the necessary legal steps had been taken and proper papers filed. On motion the report of the committee was adopted, and all the members present subscribed a certified copy of the certificate of incorporation as original members. Eight others had signified their intention to subscribe as original members as soon as they could attend a meeting of the Society, and it was resolved to give all the present members the privelege of signing on their next attendance. The further proceedings were carried on under the articles of Incorporation, Mr. John B. Smith in the chair. The committee on a union of Papilio with the Bulletin, reported in favor of such union, and recommended that a monthly Journal to consist of not less than 20 pages be issued, to be called "Entomologica Americana", Subscription price to be $2 00 per annum. They reported that it had been provided in the by-laws that a publication fund should be established and Mr. B. Neumoegen had offered $100 per annum toward defraying the cost of the new Journal. They further reported that a sub-committee had been appointed which had conferred with Messrs. Aaron and Edwards in reference to back volums of Papilio. Mr. Neumoegen had released to the Society all his claim on Vols. I, II & III, and Mr. Edwards had agreed to do the same, on condition of being elected a life member of the Society. With Mr. Aaron a similar arrangement was made, so that the Society was in the most favorable position possible to successfully publish the combination Journal, which was to cover the whole field of Entomology. On motion the report of the Committee was afterward adopted, their acts and agreements ratified, and the Committee discharged.

The Committee on By-Laws reported that they had prepared a draft, which was submitted, discussed, and with some slight amendments adopted, and the Committee discharged.

The election of Officers was then proceeded with, with the following result, President, A. W. P. Cramer; Vice Pres., Edward L. Graef; Treasurer, C. H. Roberts; Corr. Secy., and Editor, John B. Smith; Rec. Secy., A. C. Weeks; Librarian, Geo. D. Hulst; Curator, Chas. W. Leng; Executive Committee, A. W. P. Cramer, C. H. Roberts, B. Neumoegen, John B. Smith, Geo. D. Hulst, Edward L. Graef and Fred. Tepper; Publication Committee, John B. Smith, Hy. Edwards, B. Neumoegen, Edward L. Graef and Fred. Tepper.

On motion the Certificate of Incorporation and By-Laws were ordered published.

On further motion it was resolved, that, the new by-laws providing that the meetings of the Society be held on the first Tuesday of each month, and the first Tuesday of February being at hand, the next meeting be held on the first Tuesday of March.

A communication was read reporting the establishment of an Entomological Society at Newark, N. J. On motion the Secretary was directed to convey to the new Society our best wishes for its success. A large number of Publications were received; but owing to the lateness of the hour all further business was laid over until the next meeting.

* * *

Members are hereby notified that the next meeting of the Society will be held on the first Tuesday of March next, at 8 P.M. Such members as have not yet subscribed the certificate or given notice of their intention so to do, will please attend that meeting, or communicate with the Secretary as soon as possible in order that the roll of original members may be completed.

An Introduction to a Classification of the N. A. Lepidoptera.

(Continued from p. 83.)

In the last paper was given a brief review in synoptic form of the classification of the Lepidoptera as a whole. The present paper is devoted to the RHOPALOCERA.

In this assemblage of forms, characterized by antennæ which are clavate at tip, a lack of ocelli, want of the frenelum in both sexes, and diurnal habits, two distinct structural types are observable; the true Butterflies, and the *Skippers* or *Hesperids*. The latter are characterized by the very broad, short head, and the situation of the antennæ, which are as widely separated as the width of the head will allow. Their robust body, strong, often rather hairy wings, usually small size, and short jerky manner of flight renders them recognizable at a glance. At rest the primaries are elevated, the secondaries extended horizontally. Some exotic forms (*Thanaos tages*) when asleep, fold both pair of wings as do the *Bombycids* and *Noctuidae*.

The *Papiliones* or true butterflies have both pairs of wings elevated when at rest, the head is comparatively smaller than in the *Hesperids*, though in some *Nymphalidae* of good size, and the antennæ are situated rather close together near to the middle of the vertex.

In Vol. VI of the "Bulletin" pp. 37—45 I gave a synoptic table of the genera of the *Rhopalocera*, and that should be consulted by the student in connection herewith. In that paper I followed Mr. Edwards' catalogue in the arrangement of families, placing the *Papilionidae* at the head of the list. Since that time I have had an opportunity of more closely examining large collections of that family and the result is that I have become convinced that the *Nymphales* represent a higher type than the *Papiliones* and should be catalogued before them in the list. The diagram given by Mr. Scudder in the Tr. Am. Ent. Soc., Vol. VI, p. 73, seems to express very nearly the true relationship of the forms, and after verifying the structural characters referred to by him, I fully concur with his results

The table on page 38 should therefore be modified as follows:

Imago with but four fully developed legs; anterior more or less aborted in at least one sex.

Anterior tarsi aborted in both sexes; tibia weak, in ♂ brush-like, Chrysalis angular. Suspended by the tail.................................... **Nymphalidae.**

Anterior tarsi of ♂ aborted, tibia brush-like; of ♀ complete, but weak. Wings often thinly covered with scales.................................... **Erycinidae.**

Anterior tarsi of ♂ apparently complete, often ringed; but usually exarticulate and never with claws at tip. Chrysalis subulate; girthed at middle..... **Lycaenidae.**

Imago with six complete legs in both sexes.

Head moderate; antennæ approximate at base, not hooked or acutely terminated at tip. Chrysalis usually angular, girthed at middle.............. **Papilionidae.**

Head broad; antennæ widely separated at base; usually hooked or acutelly terminated at tip. Larva often pupating in a cocoon.................. **Hesperidae.**

The true relations of the families cannot be accurately expressed in cataloguing; but referring the student to Mr. Scudder's excellent paper and the diagram on p. 76 thereof for further information, the four-footed butterflies will here be all considered together.

The *Nymphalidae* are represented in our fauna by five sub-families, viz. *Heliconinae*, *Danainae*, *Nymphalinae*, *Satyrinae* and *Libytheinae.*

Various orders are adopted in cataloguing, some placing the *Satyrinae* at the head of the list, while others accord to the *Danainae* that rank. Except in the one point,—the place of the family itself,— we prefer Mr. Edwards' arrangement of the sub-families and genera, and will consider them in the order above named.

The synopsis of sub-families need not be here repeated; the student is supposed to have that in the 6th Vol. at hand.

The *Heliconinae* are essentially tropical butterflies, and the few species found in the Southern States are not all at home there; but have come from the West Indies or Mexico. The sub-family is distinguished from all the other four-footed butterflies by having the secondaries excised at inner margin, so that there is no groove for the reception of the abdomen. The antennæ are long, the wings rather narrow and elongate, often more or less hyaline, and usually very brightly colored.

The typical genus *Heliconia* is represented in our fauna by a single species, *charitonia*, which is black, and ornamented with three more or less complete, irregular, yellow bands on primaries, and two on secondaries.

The *Danainae* are represented by the typical genus *Danais*, well known to most collectors all over the world; our *archippus* is common everywhere, and can almost claim the title cosmopolitan. The genus is distinguished by the five branched subcostal nervure, and the distinctly closed cell. The secondaries are not excised; but are modified at the internal margin so as to form a groove for the reception of the abdomen. In the males there is a peculiar black raised spot on vein two of the secondaries.

The *Nymphalinae* are represented in our fauna by numerous genera, not very well marked structually considered; but very evidently characterized by a peculiar style of maculation which renders them easily recognizable. The table on p. 41 of Vol. VI is perhaps as good an arrangement for their distinction as can be at present devised.

Colaenis has the discal cell of primaries closed, of secondaries open; the tibiæ are not spinose. The wings are elongate, rather narrow, reminding one of *Heliconia*, tawny in color above and beneath; without silvery spots.

Agraulis has the same general appearance; but is much wider winged, the primaries still drawn out at apex; tawny in color, spotted above with black, and beneath marked with elongate silvery blotches on secondaries and at apex of primaris. The tibia are spined, else the genus is structurally like the preceeding. *A. vanillae* is very common in the Southern States.

Argynnis is very largely represented in our fauna, and very many species have been described. They are usually moderate in size, tawny in color, maculate with black above, and usually with silver on secondaries beneath. The maculation is all after the same type, and a species once seen. all other representatives of the genus can be recognized at a glance. The discal cell of both wings is closed.

Euptoieta resembles *Argynnis* in maculation above, but lacks the silvery spots beneath. The primaries are broader, produced at apex, and somewhat excavated above middle of outer margin. The discal cell of secondaries is open.

Diadema is large, with some resemblance to *Danais*; but the discal cell of secondaries is open. The primaries are fulvous above, black toward apex and with an oblique white band crossing this dark space.

Melitaea and *Phyciodes* substantially agree in maculation, and are often considered identical. Above, they resemble miniature *Argynnids*; but the discal cell of secondaries is open. The species referred to *Melitaea* have the apices of primaries somewhat more produced than those referred to *Phyciodes*.

Eresia and *Synchloe* are very near to *Melitaea* and are by some considered identical with it. The former has somewhat more elongate wings and more abruptly clavate antennæ, the latter is slightly excavated at outer margin of primaries below apex. These genera are very unsatisfactorily distinguished.

In *Vanessa* and *Grapta* the discal cell of both wings is open; the primaries are angulated, the secondaries shortly tailed. The species referred to *Grapta* have a silvery mark on the underside of secondaries; those referred to *Vanessa* are without this distinction.

Pyrameis is closely allied; but the wings are not angulate nor tailed, and the secondaries are ocellate and marbled beneath. Above they are as in *Vanessa*, red or brownish inclining to tawny; with black apices. maculate with white spots.

Junonia is a dark form, with one large ocellus on primaries, and two on secondaries, which give the insect a distinctive appearance. The discal cell of both wings is open. *Anartia* is a peculiar livid form, somewhat resembling *Junonia*; but having the ocelli small, and the secondaries lobate or slightly tailed.

Callicore is represented in our fauna by a very handsome species—*Clymene*. It is black, with an iridescent blue band, and a subapical white spot. The genus has the discal cell of both wings open, trigonate primaries and obovate secondaries.

Limenetis has the cell of secondaries open; the species are large; the primaries trigonate, somewhat excavate below apex. They are variable in color; *dissippus* resembling *Danais* in maculation, while *arthemis* is black with a broad white median fascia on both wings.

Heterochroa is closely allied; but has the wings dentate or scolloped: our species is peculiar by a large subapical yellowish patch on the black primaries.

Apatura has broad primaries strongly produced at apex, slightly excavated below, and the anal angle of secondaries somewhat produced. The discal cell in both wings is open. The ornamentation consists of white spots in the black apical region of primaries, one or more black ocelli above vein two, near the margin; a row of submarginal ocelli on secondaries above; and a mottled and ocellate underside.

Eurema has the secondaries tailed, the primaries subangulate, discal cell of both wings closed, tibiæ and tarsi densely spined.

Timetes has the discal cell of both wings open, secondaries with long tails, and lengthily produced anal angle. The primaries are subfalcate, and the ornamentation consists of transverse lines or shades crossing both wings.

Paphia is a robust form, with tailed secondaries and subfalcate primaries. The underside of secondaries has a "dead leaf" appearance which is peculiar and renders the insect easily recognizable.

Eunica and *Cystineura* show an approach to the *Satyridae* in the dilated veins of primaries. The former is dark in color with subcaudate secondaries and subfalcate primaries. The latter is a pale yellowish white, with dusky margins to primaries and an orange outward shading on secondaries. The wings are entire.

Agonisthos and *Victorina* are said to occur occasionally in the Southern U. S.; but are scarcely proper parts of our fauna. All the preceding genera are treated of and the species thereof described in the former volumes of the Bulletin.

Ageronia is a very interesting genus, intermediate to some extent between the *Nymphalinae* and *Satyrinae.* The costal vein of primaries is inflated, and the palpi are long. The head is broad, the eyes prominent, and the body robust. The pupæ are slender, girthed at middle, and have two ear-like tubercles. The imagines are said to produce a squeaky sound, alight on the trunks of trees and rest head downward, with expanded wings. These peculiarities have been considered sufficient to entitle the insects to sub-family rank. The middle femora are unusually long. Our species are more or less mottled with greenish and white.

The *Satyrinae* comprise butterflies of medium size, usually dull smoky brown colors, rather thin large wings and only moderately robust bodies. The ornamentation is usually more or less ocellate in character, and often very variable. This sub-family, or, as some prefer to consider it, family, has been placed at the head of the butterflies because the fore legs are most aborted, and because the Chrysalis illustrates the extreme remove from the girthed forms, being suspended by the tail only, and not at all angulate, the abdominal portion contracted in size and the thoracic region well developed.

The genera all have the veins more or less inflated at root, and modifications of this character afford convenient bases for genera.

Neonympha has two veins inflated at base, the wings entire and tibiæ not, or feebly, spinulated. The species are mostly without maculation above, or have only an apical ocellus on primaries; but differ in the maculation of under side.

Coenonympha has the three principal veins inflated at base. The species are small and unlike most others of the sub-family are usually pale, yellowish or whitish in color. The species are indefinite and largely opinionative.

Erebia has but two veins inflated, and has the club of antennæ distinct, flattened. The species have often a reddish suffusion, and are more or less ocellated above.

Debis and *Satyrodes* have the veins very slightly and gradually swollen or inflated. The latter has the secondaries entire, much as in *Neonympha*, while *Debis* has them dentate and subcaudate.

Gyrocheilus has two veins inflated: the antennal club is very gradual and not flattened, and the tibiæ are profusely spined. Our single species is black, the primaries with small white dots toward apices, the secondaries with outer margin more or less broadly orange. The hind wings too, are dentate.

Hipparchia has somewhat produced primaries, and very short middle tibia. A single species, *Ridingsii* occurs in our fauna; it is dull smoky gray, all wings with an irregular pale submarginal band, in which are ocelli.

Satyrus has the veins very suddenly inflated; the primaries rather large, secondaries with outer margin somewhat dentate or waved. The species are of moderate size, and the primaries are furnished with one, two, or three ocellate spots often set in a pale submarginal band. Beneath, the secondaries have usually a sub-marginal row of ocelli The species of this genus are very variable and largely opinionative. They afford excellent examples of local races, breading true to themselves; but in some places intergrading.

Chionobas is readily distinguished by the greatly produced apices of primaries, the thinly scaled wings, and the unusually ample secondaries. The species are northern, or mountainous.

The *Libytheinae* are very readily distinguished by their long palpi, which project forward far beyond the head, forming an obvious snout, resembling that of some of the *Deltoid* genera. A single species of *Libythea* represents the sub-family in our fauna.

The *Erycinidae* or gossamer winged butterflies are rather small, usually reddish or fulvous in color, showing their relationship to the following *Lycaenidae*. *Lemonias* is rather a robust form, with the costa of primaries straight or little arched. *Charis* is much slighter and the wings are more rounded. *Eumaeus* has the wings more or less suffused with metallic scales, and on the underside are silvery blotches.

Nemeobius resembles *Chrysophanus* in color and maculation; but the primaries are more acute at apex. None of the genera are well represented in our fauna, and the species are southern and southwestern.

The *Lycaenidae*—blues, coppers and hair streaks in common parlance— are readily recognized by the small size, the marked colors which led to their popular names, and the apparently complete foretarsi of both sexes. Really the ♂ has the fore tarsus formed of but a single joint in the cases examined by me, though that joint is clothed and ringed so as to appear upon superficial examination to be normally divided. The common *Chrys. americana* well illustrates this.

Though the species are numerous the genera are few in number.

Thecla is distinguished by the usually prominent shoulder of fore-wings and somewhat elongate secondaries: the latter are usually furnished with filiform tails, or are notched or dentate.

Fenesica is without tails, fulvous in color with rather wide black margin to primaries.

Lycaena and *Chrysophanus* differ little in structure and are by many regarded as identical. In the latter genus the eyes are hairy, the spinulation of tarsi strong, the colors usually coppery in at least one sex, and maculation consisting of black spots.

Lycaena has naked eyes, more feebly spined tarsi and the color is blue, in at least one sex.

The *Papilionidae* are, comparatively speaking, poorly represented in our country. The brilliant *Morphos* and *Ornithopteras* are entirely wanting and but a very limited number of what may be considered the more typical group of *Papilio* are found north of Mexico.

Two sub-families are represented—*Pierinae* and *Papilioninae*.

The *Pierinae* are medium or small sized insects, white, yellow or orange in color: the secondaries grooved for the reception of the abdomen, six complete legs, the anterior tibia without epiphysis.

Pieris is white, or pale yellowish, often mottled with black; moderate in size, the antennæ abruptly terminating in an avoid club.

Nathalis is a small form, yellow in color; the primaries considerably enlarged outwardly, the secondaries proportionately rather small. The anterior margin of secondaries in ♂ with an oval glandular naked impression.

Anthocharis has rather short antennæ and proportionate wings. The underside of secondaries is mottled with greenish-gray and the primaries have often a large orange apical patch. The general color is whitish or greenish pale yellow.

Callidryas contains large insects usually yellow in color, the inner margin of primaries sinuate, the secondaries beneath with silvered spots The antennal club is very gradual and the antennæ themselves, short.

Kricogonia lacks the silver spots beneath, and the antennal club is truncate.

Colias contains moderate sized species, yellow or orange in color, usually with a broad black margin to both wings and a discal spot on primaries. In some species the black is so arranged that the inclosed yellow space has a rude resemblance to a dogs head. Beneath, the secondaries are furnished with silvered discal spots. The antennæ are very short and stout; the club is truncate. The species are numerous, illy defined and largely opinionative.

Terias contains small species with markings often similar to those of *Colias*. The primaries are short, with a distinct shoulder near base, rectangular apices and straight outer margin.

The *Papilioninae* have but two genera in our fauna, distinct from all the preceding forms by having the anterior tibia furnished with epiphysis. In this respect these insects approach most nearly to the *Hesperidae* and through them to the *Heterocera* in which this structure is universal.

Parnassius has moderate sized species with very thinly scaled wings, entire secondaries which are not grooved to receive the abdomen, and the ♀ is furnished with a very peculiar pouch near tip. The larva pupates in a thin cocoon and thus furnishes another link connecting this family with the *Hesperidae*. The ornamentation consists of black spots, some of them ocellate with orange. The antennal club is not arquate.

Papilio contains large insects, usually black maculate with yellow and blue, or yellow maculate with black. The secondaries are usually tailed and somewhat elongate, not grooved to receive the abdomen; the wings are densely scaled and the antennal club arquate.

The distinctive characters of the *Hesperidae* have been already noted and only an enumeration of the genera is necessary. Mr. E. M. Aaron who has made a special study of this family, informs me that the genera at present catalogued are imperfectly and sometimes erroneously defined. As he has kindly promised to furnish the Mss. for the synopses of Lepidoptera when this family is reached, a superficial survey is all that I shall at present attempt.

Carterocephalus differs from all our other genera by lacking the tibial epiphysis and having but a single pair of spurs to hind tibia.

Ancyloxypha contains a small species with blunt primaries, spined median tibia and long abdomen. The terminal joint of palpi is long and slender.

Thymelicus has the same palpal structure but the antennæ are truncate at tip and the secondaries somewhat prolonged at anal angle.

Copaeodes is more like *Pamphila* in appearance, but smaller. The antennæ truncate, the middle tibia not spined.

Pamphila has the antennæ terminating in a little bent hook beyond the club, and the secondaries are somewhat produced at anal angle. The ♂♂ lack the costal fold.

Amblyscirtes is very like the preceding but the secondaries are evenly rounded and the primaries usually broader.

Pyrgus has the antennæ somewhat compressed at tip; a distinct brush at base, costal fold in ♂♂ distinct, discoidal stripe wanting. The species are checkered with white, and easily recognized.

Thanaos has the antennæ spindle shaped, the club arquate, and rather acutely terminated. The palpi are very densely clothed with bristly hair and the primaries are short.

Systasea is very like the preceding but the palpi are shorter, more sparsely clothed, and the antennal club is more slender.

Pholisora is also like *Thanaos*, but the brush at base of antennæ is scaly instead of hairy.

Achlyodes is peculiar by the irregular angulate wing form, which is unique in this family.

Eudamus contains large species with somewhat pointed primaries; lobate, often tailed secondaries and recurved antennal tips.

Erycides is very like the preceding but has the wing form of *Pamphila.*

Pyrrhopyga is very like *Eudamus* but the club of antennæ is obtuse, not slender, acute.

Aegiale is perhaps the most distinct genus in this portion of the series. The species are large, the body very robust, abdomen exceeding the secondaries which are not tailed. The antennæ are short, stout, straight and truncate at tip. The life history of *A. Yuccae* has been well described by Prof. C. V. Riley and the relationship of the *Hesperidae* with the *Castniares* discussed.

In the next paper some Heterocerous families will be discussed.

(To be continued.)

Taeniopteryx fasciata.

This species claims the right to be one of our earlier insects. I found the pupæ, to-day; Jan. 21st, crawling on the ice, over a small brook near Philadelphia. It is explained by the sun being warm and the day not very cold. According to Dr Hagen, Synop. N. A. Neurop. 1861, p. 34, Osten Sacken took it in Washington in April.

ACAD. NAT. SCI. PHILA. JAN. 21. S. FRANK AARON.

Are Curculio Larvae Lignivorous?

BY WARREN KNAUS.

This question is discussed in Prof. J. A. Lintner's First Annual Report on the injurious and other Insects of the State of New York, on pages 258 and 259. Thomas Walsh thought the larvæ of *Sphenophorus sculptilis* Uhlr., lived in decaying and moist wood. Mr. Lintner holds a different view, believing that the larva of this species does not differ from the habits of the family, these insects being entirely herbivorous,—quoting Westwood and C. V. Riley as authorities. Mr. Riley however is also quoted as agreeing with Walsh as to the habits of the species under discussion there.

While I do not wish to be understood as disputing such eminent testimony bearing on the food habits of these Coleoptera. my own observations have led me to adopt a conclusion somewhat different concerning at least one genus placed very near to the *Scolytidae.* I refer to *Wollastonia quercicola* (Boheman).

For the past three season I have taken this insect from Cottonwood logs in a somewhat advanced state of decay. Cottonwood is the most abundant timber in the valley of the Smoky Hill River in this, Salina, County, and I have examined trunks of the trees used in buildings. which were completely honeycombed by a small wood boring larva. I first took this beetle in the season of 1881, it appearing about the first week in June and continuing until July.

I have invariably taken this insect on or in, or in the immediate vicinity of Cottonwood logs or stumps The present season I took about a dozen specimens from logs that had been used in a stable for the past seventeen years; a number were taken from the larval burrows, and numbers of small white fleshy larvæ were also observed in the same pieces of timber: these larvæ I feel confident were those of *W. quercicola,* but as I found no pupæ and did not continue my observation on their transformations, I cannot speak with absolute certainty.

I am still further strengthened in the conviction that the larvæ of this insect are wood eating, by the fact that it has a close structural relation to the *Scolytidae.* This is pointed out in Leconte and Horn's Classification of North American Coleoptera, and the affinities of several genera (closely related to the one under discussion), with particular genera of *Scolytidae* are specially noticed. Further observation, I trust, will remove all doubts as to the food habits of *Wollastonia quercicola.*

Dynastes, again.

In Mr. Doll's article on page 120, I was responsible for the "Colorado". This was error: "Hell's Canon" is in Arizona, some forty miles from Prescott. Dr. Horn informs me that the species was probably his *Grantii*, though none of his specimens are as large as those caught by Mr. Doll. *Grantii* occurs in Arizona, Colorado and New Mexico; and with Mr. Doll's note on its habits they should be found by any collector visiting those States, even though they be not fortunate enough to enjoy the trip through the canon with the suggestive name. The date, it may be added, was September. J. B. S.

Book Notice.

Short Studies of North American Coleoptera. (No. 2.) By John L. Leconte, M. D. Trans. Am. Ent. Soc. XII, pp. 1 to 32.

This is a collection of such fragmentary manuscripts as were left by Dr. Leconte at the time of his death, edited by Dr. Horn. It contains descriptions of a considerable number of new species and a revision of four genera of the *Elateridae*—*Drasterius*, *Megapenthes*, *Elater* and *Agriotes*. A considerable amount of new synonomy is contained in this paper, and the tables are clear and very practical.

* * *

A Study of some Genera of Elateridae. By Geo. H. Horn, M. D. Trans. Am. Ent. Soc. XII, pp. 33 to 52.

This paper is to an extent supplementary to that preceding, containing synopses of *Horistonotus*, *Esthesopus* and *Ludius*, and brief notes on several other genera. Dr. Horn's work is always well done, and this paper is no exception.

These two papers partially fill a great gap in our literature, for the Elaterid genera are not only very indefinte, but there is also so much variation in and yet so much resemblance between species, that proper determination has been a matter of great difficulty, and considerable uncertainty. *Melanotus*, *Limonius* and *Corymbites* are still stumbling blocks and we hope that Dr. Horn's plans provide for an early review of those genera.

* * *

We have received from Prof. Fernald and Mr. Hy. Edwards that part of the "Standard Natural History" devoted to Lepidoptera. According to the plan of the work, Prof. Fernald begins with the lowest of the *Heterocera* and Mr. Edwards ends with *Papilio*, as the highest of the *Rhopalocera*. In judging of this work it must be remembered—I quote Prof. Fernald—"that I was allowed only so many pages, and 'it must be popular'". Of course, under those circumstances only the most cursory survey of the field could be taken. And Entomology seems after all to occupy only a secondary or tertiary position in the estimation of the publishers; so that besides an enumeration and popular definition of the prin-

cipal groups, and remarks on a few species of economic interest or extraordinary splendor, nothing is attempted. Not only American but exotic forms are embraced, and a fair number of illustrations—some of them distressingly familiar—are given. To the Entomologist there is nothing of special interest: to the general reader there is enough to hold his attention. If the remainder of the work be as superficial as what we have seen of the Entomological portion, the title "Standard" is a misnomer. Of course no criticism is intended adverse to Messrs. Fernald and Edwards. Their work is the best that could be produced under the circumstances, and Prof. Fernald's review of the Heterocera in 30 pages is certainly as well done as it could possibly be in that space. Referring again to the illustrations, it is certainly inexcusable that fig 557 is given as that of a *Tineid*, while in fact it is placed in our lists among the *Zygaenidae* and is probably a *Lithosiid*. Fig. 561, as the "codling moth" is certainly the poorest portrait of that insect that was ever perpetrated. Prof. Fernald disclaims all responsibility for figures, and we do not believe that he would be guilty of such blunders.

J. B. S.

Notice to Readers.

With this number, the Bulletin of the Brooklyn Entomological Society ceases to exist. For seven years we have done our mite toward advancing the science of Entomology, and have gradually grown and received support from every hand. It is with a feeling of pride that we look back and note improvement in our paper.

The unanimous expression of the desirability of a union of Entomological Journals into one paper which might call to it the support of all those interested in Entomology, led to negotiations between the representatives of the "Bulletin" and "Papilio"; resulting in an arrengment for the issuing of a new publication, for which the name "Entomologica Americana" was decided on.

It was decided that the new Journal should be issued by the Brooklyn Entomological Society, and the measures taken by that Society for the support of the new Journal are found in the following by-laws of the Society.

The first number of the new Journal which we commend to all Entomologists will be issued in April and will be sent to the subscribers of two Journal above named. It will be edited by Mr. John B. Smith, and the subscription price will be $2.00 per annum.

THE PUBLICATION COMMITTEE.

CERTIFICATE OF INCORPORATION.

STATE OF NEW YORK, } *ss.*
COUNTY OF KINGS. }

We, Edward L. Græf, George D. Hulst, John B. Smith, Berthold Neumœgen, Charles W. Leng and Christopher H. Roberts, all of full age, citizens of the United States and of the State of New York, do hereby certify that we desire to form a Society pursuant to the provisions of an act entitled "An Act for the Incorporation of benevolent, charitable, scientific and missionary Societies", passed April 12, 1848, and the several acts extending and amending said act.

That the corporate name of said Society shall be the "Brooklyn Entomological Society".

That the object, for which the Society is to be formed, is the advancement of the science of Entomology in all its branches.

That the term of the existence of said Society is to be fifty years.

That the number of trustees that shall manage the affairs of the Society is seven and they shall be termed the Executive Committee.

That the names of the trustees or members of the Executive Committee who shall manage the affairs of the Society for the first year of its corporate existence are: Edward L. Græf, Fredk. Tepper, George D. Hulst, Henry Edwards, Berthold Neumœgen, John B. Smith and Christopher H. Roberts.

That the name of the City and County in which the operations of said Society are to be carried on, are the City of Brooklyn and County of Kings.

In Witness whereof we have hereunto set our hands this 13th day of January 1885.

EDW. L. GRAEF, GEO. D. HULST, JOHN B. SMITH,
BERTHOLD NEUMOEGEN, CHAS. W. LENG, CHRISTOPHER H. ROBERTS.

STATE OF NEW YORK, }
CITY OF BROOKLYN, } *ss.*
COUNTY OF KINGS. }

On this 13th day of January 1885, before me personally came and appeared Edward L. Græf, George D. Hulst and John B. Smith to me known to be three of the individuals described in and who executed the foregoing certificate, and they severally before me signed the said certificate and acknowledged that they executed the same for the purposes therein mentioned.

ARCHIBALD C. WEEKS,
Notary Public, Kings County.

STATE OF NEW YORK,
CITY AND COUNTY OF NEW YORK. } *ss.*

On the 16th day of January, 1885, before me personally came Berthold Neumoegen, and on the 23d day of January, 1885, before me personally came Charles W. Leng, and on the 26th day of January, 1885, before me personally came Christopher H. Roberts to me personally known and known to me to be three of the individuals described in and who executed the foregoing certificate and severally acknowledged to me that they executed the same for the uses and purposes therein expressed.

ARCHIBALD C. WEEKS,
Notary Pulbic, Kings County.

Certificate filed in New York County.

(ENDORSEMENT,)

I, a Justice of the Supreme Court of the District in which the principal office of the Brooklyn Entomological Society is to be located do hereby approve in all respects of the within certificate of incorporation of said Society, and consent that the same be filed pursuant to law.

Dated Brooklyn, January 27, 1885.

EDGAR M. CULLEN,
J. S. C.

STATE OF NEW YORK.
COUNTY OF KINGS. } *ss.*

I, Rodney Thursby, Clerk of the County of Kings, and Clerk of the Supreme Court of the State of New York, in and for said County (said Court being a Court of Record) do hereby certify, that I have compared the annexed with the original certificate of Incorporation of "Brooklyn Entomological Society" filed and recorded in my office January 27, 1885, and that the same is a true transcript thereof and of the whole of such original. In testimony whereof I have hereunto set my hand and affixed the seal of said County and Court, this 27th day of January, 1885.

RODNEY THURSBY,
(L. S.) Clerk.

STATE OF NEW YORK.
OFFICE OF THE SECRETARY OF STATE. } *ss.*

I have compared the preceding with the original Certificate of Incorporation of Brooklyn Entomological Society with acknowledgment thereto annexed filed and recorded in this office on the 27th day of January, 1885, and do hereby certify the same to be a correct transcript therefrom and of the whole of the said original.

(L. S.) Witness my hand and the seal of office of the Secretary of State, at the City of Albany this 27th day of January, one thousand eight hundred and eighty-five.

JOSEPH B. CARR,
Secretary of State.

The following is a list of those who have subscribed as original members or indicated their intention so to do.*

G. W. J. Angell.
Wm. Beuttenmuller.
A. W. Putman Cramer.
Jacob Doll.
Chas. A. A. Duering.
Henry Edwards.
S. L. Elliot.
Geo. Frank.
Chas. Fuchs.
Geo. Gade.
Chas. F. Gaul.
Alwin Gottweiss.
Edw. L. Græf.
H. Herper.
Geo. D. Hulst.
Chas. W. Leng.
M. L. Linell.
A. Luetgens.
Jul. Eduard Meyer.
Julius Mohns.
B. Neumoegen.
Richd. F. Pearsall.
Christ. H. Roberts.
Stephen P. Sammis.
L. C. Schenk.
W. Schenk.
F. M. Schwensen.
John B. Smith.
F. A. Stinner.
Fredk. Tepper.
Wm. Waters.
Archibald C. Weeks.

BY-LAWS OF THE
BROOKLYN ENTOMOLOGICAL SOCIETY.

ARTICLE I.

Of Members.

Sec. 1. The society shall consist of ordinary, life, corresponding and honorary members. The ordinary and life members only shall be members of the corporation, and shall be entitled to vote, hold office and transact business.

Sec. 2. Corresponding and honorary members shall be entitled to all other priveleges of ordinary and life members, but shall not be subject to fees or dues.

Sec. 3. All members shall be entitled to all the publications of the Society and to all other advantages save as above specified.

Sec. 4. Honorary members may be elected on motion of any life or ordinary member at any stated meeting of the Society; but no person shall be elected as such, unless he has attained a recognized high rank in Entomological Science, or has done some act materially furthering the progress of Entomology or of the Brooklyn Entomological Society.

Sec. 5. Corresponding members may be elected at any stated meeting of the society, on like motion as in the case of honorary members; and any person not a resident of the United States from whom the society receives benefits in the way of additions to its library, or in any other material way, is eligible as such member.

---

* A few others are still to be heard from.

Sec. 6. Ordinary and life members may be proposed by an ordinary or life member of the society at any stated meeting, but shall not be elected until the next stated meeting, except upon motion of some person other than the proposer, and upon unanimous consent of those present. A three-fourths vote of those members present is required to elect a member of any class.

Sec. 7. Any person regularly elected may become a life member by the payment of fifty dollars in money, or in what the society shall consider an equivalent thereto, and he shall not be subject to any further dues or assessments; nor shall he be required to pay an initiation fee, if originally proposed as a life member.

Sec. 8. Ordinary members shall on election pay an initiation fee of two dollars, and annual dues to an amount not exceeding six dollars, payable in equal monthly instalments; but no dues shall be charged for the month, in which he is elected. The dues shall be six dollars per annum until reduced by a resolution of the society, passed as prescribed by law for a change of by-laws.

Sec. 9. Members six months in arrear shall be notified by the Treasurer, and if such indebtedness continue for three months thereafter, such member shall upon one month's previous notice in writing be dropped from the roll of the Society, unless the executive committee, for reasons deemed sufficient by them, accord a further extension of time.

ARTICLE II.

OF OFFICERS AND THEIR DUTIES.

Sec. 1. The affairs of the society shall be managed by an Executive Committee of seven, of which the President and Treasurer of the society shall be *ex-officio* members. The executive committee shall be elected each year at the annual meeting, and shall hold office for one year, or until their successors are elected. Vacancies by death, resignation or otherwise may be filled at any stated meeting, and the person elected to fill a vacancy shall hold office only during the unexpired term of the person in whose place he was elected. The executive committee shall have charge of all the property of the society, and shall audit all bills, and transact all business relating to the society and not otherwise provided for. The vote of a majority of all the members of the committee shall be necessary to authorize any expenditures of money, or other disposition of property belonging to the society.

Sec. 2. The other officers shall be a President, Vice President, a Corresponding Secretary, a Recording Secretary, a Treasurer, a Curator, a Librarian and a Publication Committee; all of whom shall be elected by ballot at the annual meeting, and serve one year, or until their successors are elected. Vacancies by death, resignation or otherwise may be filled at any stated meeting for the unexpired term only. In case for any reason officers can not be elected at the annual meeting, they may be elected at the next, or any future stated meeting, and the officers of the preceding year shall hold over until their successors are elected. A majority vote of those present and voting shall be requisite for election.

Sec. 3. The President, or in his absence the Vice President, shall preside at the meetings of the society and perform all other duties usually appertaining to that office. The President shall also be *ex-officio* chairman of the executive committee.

Sec. 4. The corresponding Secretary shall conduct and preserve the correspondence of the society.

Sec. 5. The recording Secretary shall keep a book containing an accurate record of the transactions of the Society. Such book shall always be open to the inspection of members of the society.

Sec. 6. The Treasurer shall have charge of and shall be authorized to receive all moneys belonging or due to the society, and pay all proper claims against it, after they have been audited by the executive committee. He shall have power to deposit moneys in any Banking Institution selected by the executive committee, in the name of the society, and shall have power to draw checks, sign receipts and do all necessary acts relating to the proper management and care of the moneys of the society. He shall keep an accurate record of his transactions in a book, which shall always be open to the inspection of members and shall report monthly upon the state of the assets and liabilities.

Sec. 7. The Librarian and Curator shall respectively have charge of the library and collection of the society.

ARTICLE III.

OF MEETINGS.

Sec. 1. The stated meetings shall be held on the first Tuesday of each month, and its annual meeting on the first Tuesday after the first Monday in January.

Sec. 2. Special meetings may, and on the written request of five members shall be called by the President at any time, at least three days notice thereof being sent to each member.

Sec. 3. Seven members shall constitute a quorum for the transaction of business.

Sec. 4. The order of business at stated meetings shall be as follows:

1. Reading and action on the minutes of the previous meeting.
2. Reports of Officers and Committees.
3. Proposals and Elections.
4. Donations to Cabinet and Library.
5. Written communications.
6. Verbal communications.
7. Unfinished business.
8. Informal discussion—on motion.
9. New business.
10. Scientific discussion.
11. Adjournment.

ARTICLE IV.

PUBLICATIONS.

Sec. 1. The publications of the society shall be managed by a committee to consist of four members and the editor or editors for the time being. They shall be elected at the annual meeting in the same way as are the other officers and shall hold office for one year, or until their successors are elected.

Sec. 2. An editor or editors shall be elected annually by the society at the stated meeting held previous to the termination of the current volume, who shall, subject to the control of the publication committee have charge of the society's publications, and shall hold office until his or their successor or successors is or are elected. He or they shall be members of the publication committee, and one of them shall be selected by the committee as chairman. He, or if more than one, either of them, may at any time call a meeting of the committee.

Sec. 3. The society shall support and publish a monthly Journal to be called Entomologica Americana, which shall contain the proceedings of the society, and such matter on general and special Entomology as the publication committee shall order printed.

Sec. 4. To support such Journal a publication fund shall be established by the society, which shall consist of: 1st, Voluntary contributions; 2nd, The money proceeds of Life Memberships; 3d, Surplus revenue, after paying current expenses; among which is to be considered the cost of publishing the current volume in each year.

Sec. 5. The principal of this fund shall remain intact, and shall be invested by the Treasurer, under the direction of the executive committee. The interest of the fund shall annually be added to the principal until the limit hereinafter specified is reached, unless the same is declared by the publication committee to be necessary to pay any part of the deficit arising from the publication of the Journal.

Sec. 6. The amount of the publication fund shall be limited to ten thousand dollars. Whenever that limit is reached the sums otherwise to be applied to it shall be applied to the library and collections of the society, or in such other manner as the society shall determine.

Sec. 7. Whenever the income of the publication fund shall exceed in amount the difference between the amount of subscriptions received and the cost of publishing the journal of the society, then the latter shall be enlarged to such an extent as the surplus shall warrant, or the surplus shall be used in such other publications as the society shall decide to issue.

Sec. 8. The Journal, Entomologica Americana, shall be issued monthly and twelve numbers shall constitute a volume. The numbers during the first year shall average twenty pages, and in future years such number as the sums applicable to the payment of current volumes shall authorize.

Sec. 9. Current volumes of the journal shall be paid for:—first, By subscriptions; second, The ordinary revenue of the society, after deducting the necessary expenses authorized by the executive committee; third, By donations for that purpose.

ARTICLE V.

BY-LAWS.

These by-laws are adopted pursuant to the provisions of the statutes under which this society is incorporated, and alterations or amendments shall not be made except in accordance with said statutes. Any alteration or amendment must be proposed in writing at a stated meeting, and shall not be acted upon until the next stated meeting. A three-fourth vote of all the members present and voting shall be necessary to carry any amendment.

INDEX TO VOL. VII.

PAGE

Blanchard, Frederick.
- Table of *Balaninus* 106
- Note on the species of *Gaurotes* 108

Book Notices 12, 79, 106, 126, 151

Casey, Thos. L.
- Notes on Coleoptera 64

Clarkson, Frederick.
- Note on Rhyssa 124

Cramer, A. W. P.
- On preserving larvæ 93
- (Constitution and by-laws of the Society.) 155

Doll, J.
- Note on Dynastes 120

Editorial Notes 79, 125

Entomological Club of A. A. A. S.
- Proceedings of (Abstract) 84

Fuchs, Chas.
- Hint on Spring Collecting 6
- Collection Note 126

Horn, Geo. H., M. D.
- Notes on some Staphylinidae 121

Hulst, Geo. D.
- The genus Catocala 14
- Synopses of Lepidoptera 101, 109
- Spilosoma latipennis 120

Jones, Alfred W.
- Notes on the habits of Cicindelidæ 74

Leng, Charles W.
- Synopses of Cerambycidae —vide list of genera. Miscellaneous Notes 76

Letters to Editor 122

Mann, B. Pickman.
- The future of "Psyche" 122

Reinecke, O.
- Note on Phytonomus opimus 76

Riley, Chas. V.
- Acronycta betulæ, n. sp. 2
- A new insect injurious to wheat 111
- Note on Rhyssa 123

Roberts, Chris. H.
Collection Notes.................... 77
Schwarz, E. A.
Notes on the food habits of some N. A. Rhynchophora.................... 84
Smith, John B.
New species of Noctuidæ.................... 3
An introduction to a classification of the N. A. Lepidoptera.... 70, 81, 141
Dynastes again.................... 151
Society News.................... 68, 103, 105, 127, 139
Williston, Dr., S. W.
On the classification of North American Diptera (first paper, *Syrphidæ*) 129

INDEX TO SYNOPTIC TABLES.

LEPIDOPTERA.

Chionobas (Hulst).................... 109
Coenonympha (Hulst).................... 101

*COLEOPTERA.**

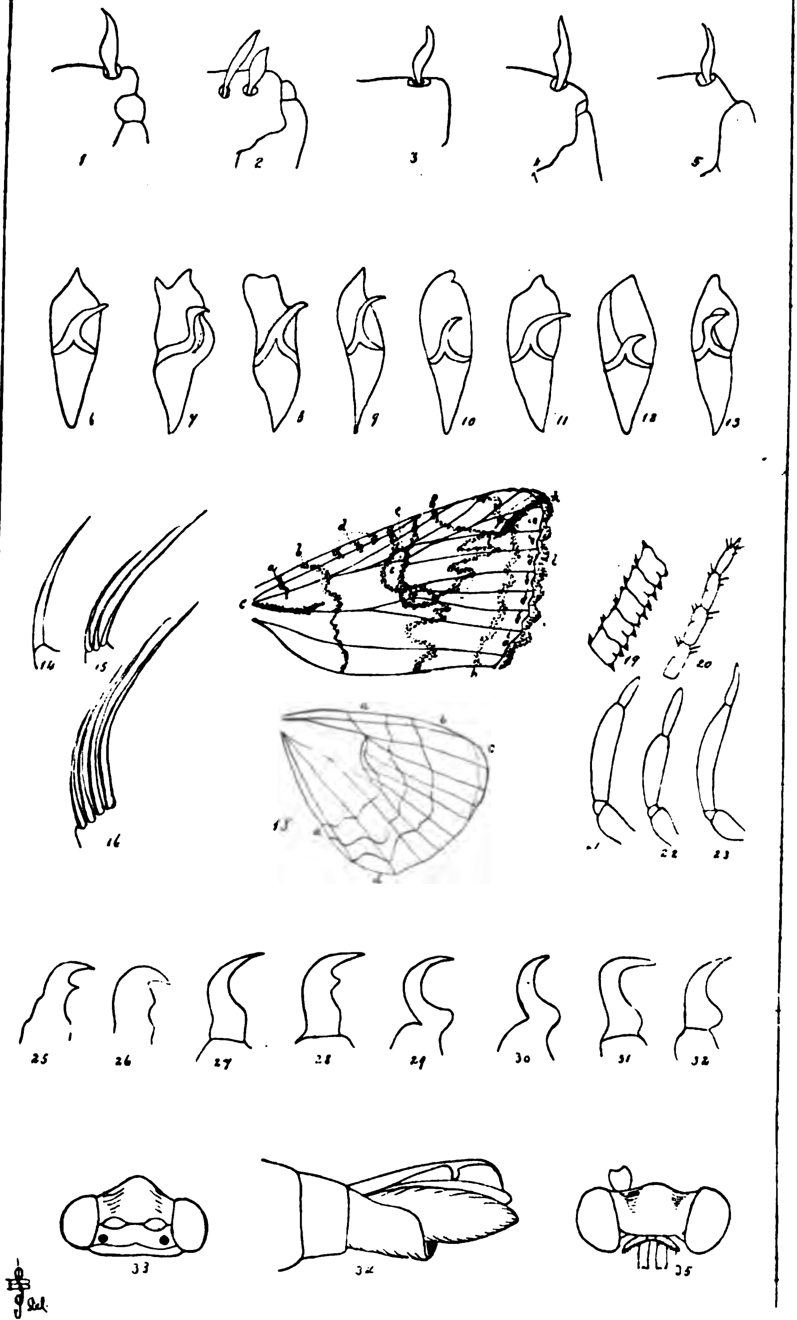
Achryson.................... 117
Asemum.................... 62
Axestinus.................... 118
Balaninus (Blanchard).................... 106
Brothylus.................... 119
Callidioides.................... 61
Callidium.................... 112
Cerambycinae.................... 60
Cerambycini.................... 114
Cerambycoides.................... 114
Criocephalus (Leconte).................... 63
Derobrachus.................... 10
Dicentrus.................... 96
Dryobius.................... 117
Elateropsis.................... 60
Ergates.................... 8
Eucrossus.................... 116
Gonocallus.................... 97
Gracilia.................... 118
Hammaticherus.................... 118
Haplidus.................... 117
Homaesthesis.................... 57
Hylotrupes.................... 98
Malacopterus.................... 115
Mallodon (Horn).................... 9
Notorhina.................... 63
Oeme.................... 116
Opsimus.................... 96
Orthosoma.................... 11
Osmidus.................... 119
Phymatodes.................... 98
Physocnemum.................... 97
Prioninae.................... 7
Prionus.................... 57
Rhopalopus.................... 97
Smodicum.................... 96
Sphenostethus.................... 60
Stenodontes.................... 9
Stromatium.................... 119
Tetropium.................... 95
Tragosoma.................... 59
Xylocrius.................... 113

ERRATA.

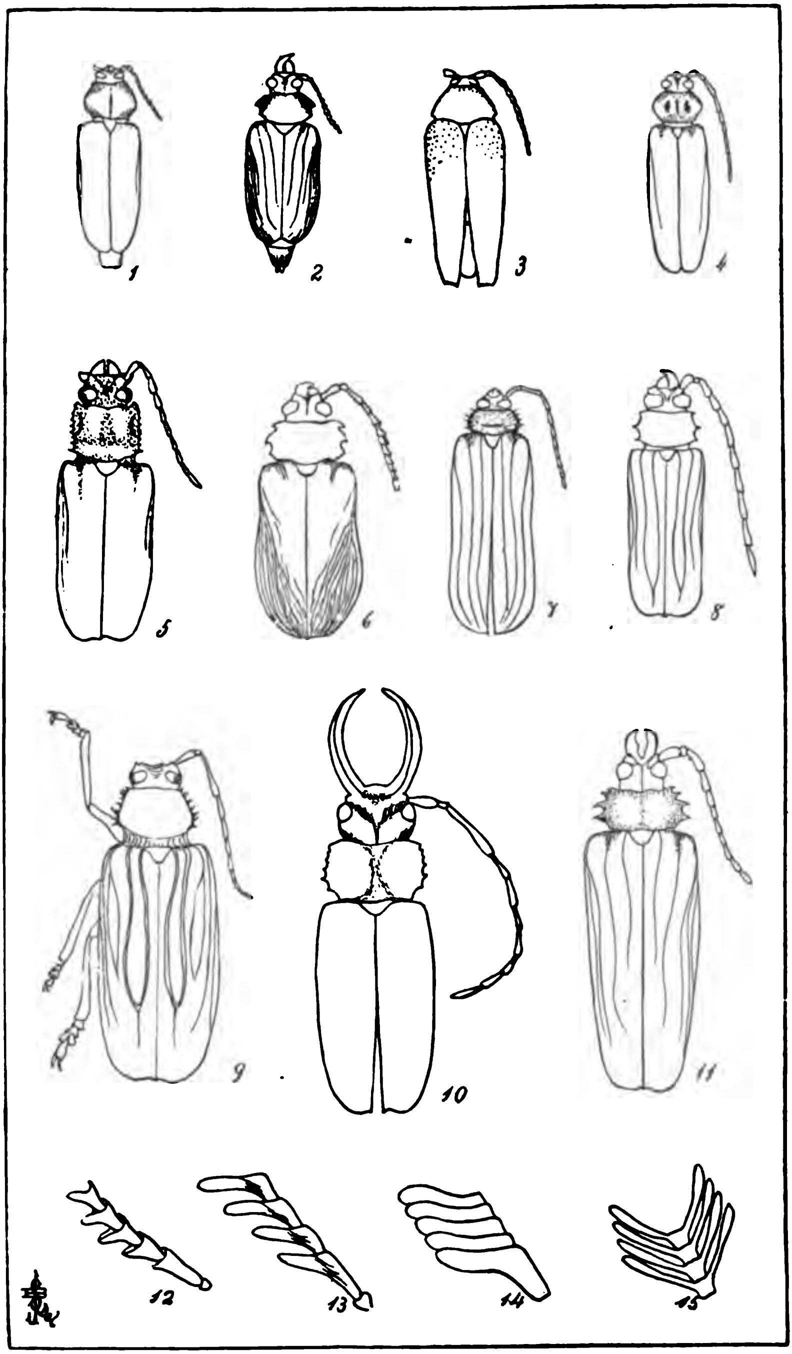
Page 30 under category 23, for "present" read "wanting" on first line. On second line, for "wanting" read "present".
" 65 insert after the description of *L. tabacinus*, the locality Arizona.
" 66 9th line from bottom for Laferte, read La Ferté.
" 66 7th " " " localition, read localities.
" 67 10th " top " fully, read feebly.
" 83 29th " " first word for 25 read 22.
" 85 10th " " for "wigs" read "twigs".
" 111 for "Isosoma grandis" read "Isosoma grande".
" 121 line 22, for "is there" read "there is".

---

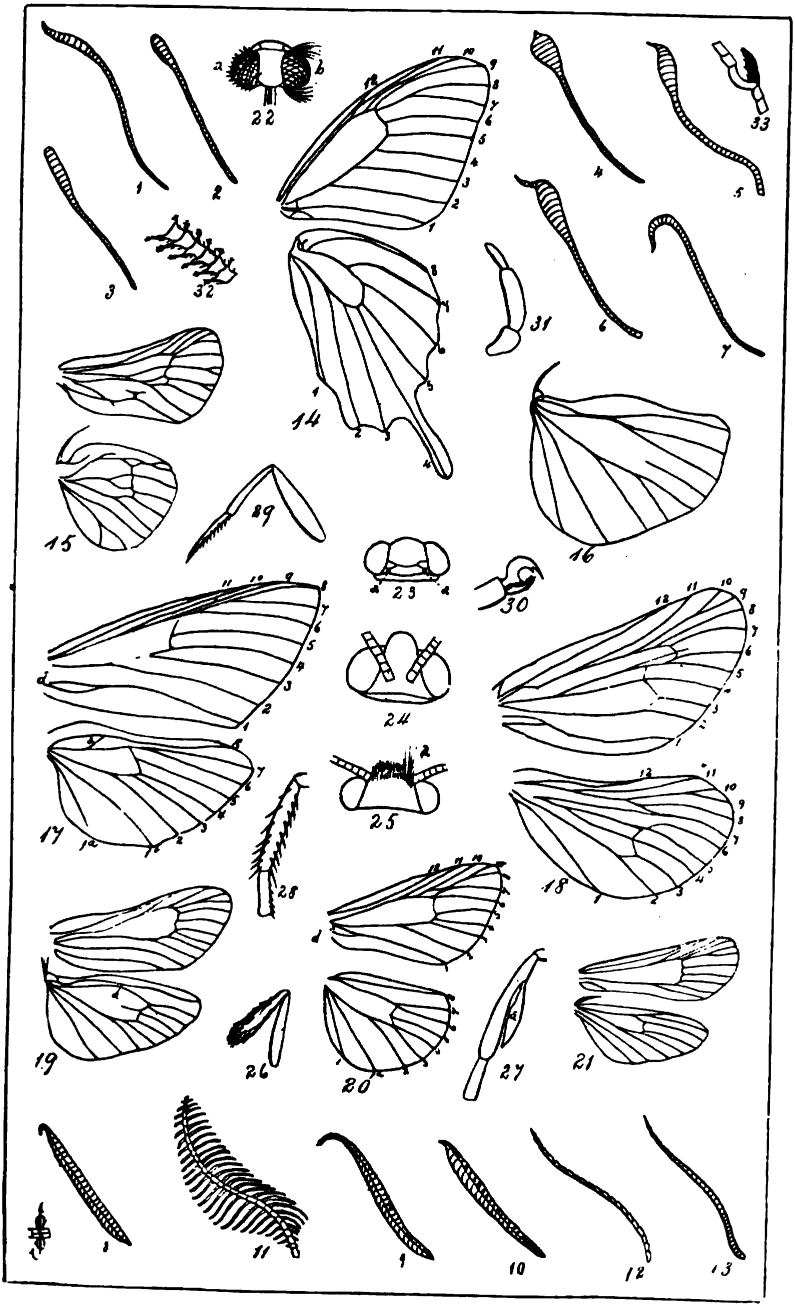
* Where no authority is specified, Mr. Chas. W. Leng is understood. The synopses of families and genera are adopted from the "Classification".


a
b
c
d
e
f
g
h
del.

Exp [illegible]



E. [illegible] 14.



JUN 18 1917

Explanation [illegible]